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“It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermitted: and it will die away, if they shall entirely cease.”—

SIR WM. JONES.

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On a Passage in the tenth Book of the Sáhitya Darpana.—By
E. B. COWELL, M. A.

The Sáhitya Darpana has been called “the standard of taste among the learned Hindús.” It was compiled by Vis’wanátha Kavirája, who is said to have lived in the district of Daeca, and his date may be conjecturally placed in the 15th century. His book contains a complete system of Literary Criticism, from words and sentences to dramas and epic poems. Its prevalent fault is a proneness to minute subdivision,* and many parts of it relate to obscure trivialities; but much of it displays an ingenuity and insight, which only require to be understood to be appreciated. The tenth book is devoted to the especial embellishments of style,—*alankára* in its more technical sense; and many keen observations are scattered through its pages, which often touch on points left unnoticed by the more ambitious writers on Rhetoric in the West. As an example, I have chosen the section on Simile, which seems to me a very favourable specimen of the delicate analysis of the Hindú Rhetoric, while, at the same time, it will afford an opportunity for making an important correction to the text as it now stands in print.

* At once the strength and weakness of the self-developed Hindú mind! “Maximum et velut radicale discrimen ingeniorum, quoad philosophiam et scientias, illud est; quod alia ingenia sunt potiora et aptiora *ad notandas rerum differentias*; alia ad notandas rerum similitudines. Utrumque ingenium facile labitur in excessum, prensando aut gradus rerum aut umbras.” *Nov. Org.* I. iv.

Two editions of the original have appeared in Calcutta, in 1828 and 1851; but in consequence of the imperfect condition of the MSS. on which they were founded, an important sentence has, till now, remained perfectly unintelligible from an omission of three lines in the very centre of the argument.

The Hindú analysis of Simile and Metaphor appears in the form of a series of four terms, composed (if I may say so) of two *factors*, of which the one decreases while the other increases in equal proportion. The principle on which the division is founded, is the position of the *subject* of the comparison relatively to the *object*, and the extent to which it is able to maintain its own individuality or is forced to yield it up to its rival. These four gradations are called *Upamá*, *Utprekshá*, *Rúpaka* and *Atis'ayokti*.

In the first, we have a simple Simile; the object (*upamána*) is only introduced for the sake of illustration, and the subject (*upameya*) retains its own independent position. Thus in the sentence, "her face is fair as the lotus," the subject, the face, retains its individuality unimpaired, and the idea of the lotus is only an accessory, which is kept in its strictly subordinate position.

In the second, *Utprekshá*, we may observe a change in their relative position; the individuality of the subject is beginning to waver, and retreat into the baek ground; while that of the object is assuming a new prominence. In the sentence "her face is, as it were,* a lotus," the attributes of the lotus are threatening to encroach upon those of the face,—we are beginning already to lose the one in the other.

In the third, *Rúpaka*,† this change has come to pass. In the sentence "her face *is* a lotus" or "the lotus of her face," the attributes of the lotus have usurped the place of those of the face,—the one seems to have passed into the other and its own personal identity is being absorbed. But it is still to be recognised,—the metamorphosis is not wholly complete. It is like Ovid's account of the Centaur's daughter, when the curse has begun to operate,

* The same result is produced by such phrases as "methought," &c. see *Sútra* 691.

† I may notice in passing a subdivision of *Rúpaka*, called *Parináma*, where the usurping idea is not purely ornamental (as in *Rúpaka*) but helps on the original topic, as e. g. 'Her eyes were stars to guide the wanderer home.'

—nec verba quidem nec equæ sonus ille videtur,
Sed simulantis equam.

But when Ovid goes on to add

parvoque in tempore certos

Edidit hinnitus,

we have a parallel to the fourth, *Atis'ayokti*, where the metamorphosis is finally accomplished,—the subject being no longer visible, as it is wholly swallowed up in the object and identified with it. Thus when in Persian poetry we have "*narcissus*" used for "*eye*" and "*cypress*" for "*a woman's figure*," these ideas, which in the simile would have been only subordinate, have not only advanced into prominence, but have completely overgrown and concealed the original.*

The following may serve as English illustrations of the series.

She lived among untrodden ways—

.. .. .

A violet by a mossy stone

That never meets the eye,

(*Rúpaka.*)

Fair as a star when only one

Is shining in the sky.

(*Upamá.*)

I saw thee weep—the big bright tear

Stood in thine eye of blue,

And then, methought, it did appear

A violet dropping dew.

(*Utprekshá.*)

To behold the wandering moon,

Riding near her highest noon,

Like one that had been led astray

Through the heaven's wide pathless way,

And oft, as if her head she bowed

Stooping through a fleecy cloud.

(*Utprekshá.*)

* The most singular specimen of *Atis'ayokti* I have met with is the following anonymous stanza on a woman who stands weeping at her husband's door.

लतामूले लीनो हरिणपरिहोवो हिमकरः
स्फुरन्ताराकारा गलति जलधारा कुवलयान् ।
धुनोते बन्धूकं तिलकुसुमजन्मा हि पवनो
वह्निद्वारे पुण्यं परिणमति कस्यापि छतिनः ॥

Oh what a noble mind was here o'erthrown!
 The courtier's, scholar's, soldier's, eye, tongue, sword;
 The expectancy and rose of the fair state,
 The glass of fashion and the mould of form! (*Rúpaka.*)

Atis'ayokti, I fear, is but seldom used by our severer western taste, but we have it exemplified in the following line of W. S. Landor.

That rose through which you breathe—come bring that rose.

In Persian poetry, it is common enough, as in the following line of Háfiz :

“I am the slave of the drunken narcissus of that tall cypress.”

The following is a brief outline of the Sáhitya Darpaṇa's account of these figures.

Upamá is defined as “the expressed resemblance [and not implied, as in *Rúpaka*] of two things in one sentence, without the mention of any dissimilar attribute.”

Utprekshá is “the hypothetical conceiving of the original subject under the form of something else.” Its hypothetical character must always be shown by the employment of such phrases as “methinks,” “as it were,” &c., as otherwise it would merge into *Rúpaka*; except when we are describing only a cause or result, as in the lines of the Raghuvans'a, “the arrow shot by Ráma, having pierced Rávana's heart, flew on and entered the ground as if to bear the news to the lower world.” This would still be an instance of *Utprekshá*, even if “as if” were omitted.

Rúpaka is “the superimposition of a conceived form over the original subject.”

For *Atis'ayokti*, I subjoin a literal translation of the chapter where this figure is described; its reach, however, as will be seen, extends much wider than the single case, for which I have used it above. Additions to the text, by way of explanation, are given in brackets.

“*Sútra* 693. *Atis'ayokti* [or hyperbole] is applied when the introsusceptive energy is actually completed [and not merely threatened as impending.]

Adhyavasáya [the introsusceptive energy,] is found where the idea is produced of the identity of the object and the subject, from the latter's being swallowed up in the former. In *Utprekshá* this was

only regarded as a future liability, since the object was not stated as being definitely placed for the subject, [but qualified by “as it were”]; but here the actual result produced is this very impression. (Still in *Utprekshá* to a certain degree the subject was swallowed up in the object in consequence of its being placed in the background, and in *Atis’ayokti* too we can have the same in such phrases as “her face is a second moon,”* since they say,

“The wise hold that the subject is swallowed up in the object when the former is not named in the sentence, and even also when it is named, if it be thrown as subordinate in the background.”)

Sūtra 694. *Atis’ayokti* may have a five-fold division,—identity where there is difference,—disconnection where there is connection,—the opposites of these—and a violation of priority and posteriority in cause and effect.

By “the opposites of these” I mean—difference where there is identity, and connection where there is disconnection. For an example of identity where there is difference, take these lines of mine.

“How can it be! a peacock’s feathers above, and under it shines a fragment of the moon eight days old, and next a pair of lotuses dancing, and then a *tila* flower, and under that a new shoot!”

Here we have the introsusceptive energy manifested by the identity [in spite of the real difference,] of the fair one’s hair, &c., with the peacock’s feathers, &c. [the half-moon being her forehead, the lotuses her eyes, the *tila* her nose and the new shoot her lips]: or again in the verses quoted from Ráma’s speech, in a former part of the treatise:

“This is the spot where seeking thee I came to the anklet thou hadst dropped on the ground; but I saw it not, as it lay fixed in silence, as though from sorrow at its separation from thy lotus-foot.”

Here the attribute of silence in a sentient being is one thing, and that in a non-sentient is another; but the poet produces the idea of their identity in spite of their real difference. Or again, in the line,

* When you boldly say “her face is another moon,” as there is only one moon (*scil.* in Hindú science,) you really make as much exaggeration as if you dropped the face altogether and spoke only of “her moon.”—“Her face is fair as the moon” is *Upamá*; “her face shines as if it were a moon” *Utprekshá*; “her face is a moon,” *Rúpaka*; “her face is a second moon,” or “her moon” *Atis’ayokti*. Many authorities, however, deny that the former of these is properly *Atis’ayokti* at all.

“The lover also had *rága* in her youth as well as her leaf-like lower lip.”

Here *rága* in the case of the lip means ‘redness,’ but in the case of the lover ‘affection’ [from the root *ranj* having these two significations]; but the two meanings are rhetorically treated as identical.

2. ‘Difference in identity’ may be seen in the following :—

“The grace of her limbs is wholly *sui generis*,—the wealth of her sweet odour is something utterly different ; the freshness of her with the eye like a lotus-leaf is indeed supernatural.”

3. “Disconnection in connection ;” as in these lines from the *Vikramorvasí*.

“Say, was it the moon, the giver of beauty, who was the Prajapati in her creation ? or was it Káma himself, his whole soul immersed in love ? or was it the month that is richest with flowers ? How indeed could an ancient sage, cold with continued study of the Vedas, and his desires turned away from all objects of sense, create this mind-ravishing form ?”

Here the idea of disconnection is produced, in spite of the real connection which did exist between her creation and the sage Náráyana [who actually produced her.]*

4. Connection in disconnection ; as in the following :

“If two lotuses were planted in the disk of the moon, then her fair-eyed face would be exactly imitated.”

Here by the force of the particle “if,” the idea is hypothetically suggested of a possible connection between the subject and the object introduced.

5. The violation of priority and posteriority in cause and effect can happen in two ways,—*a.* in the production of the effect before the cause, and *b.* the occurrence of both at the same time.

a. “*First* indeed was the mind of the fawn-eyed maidens bewildered with regret, and *afterwards* appeared the beauty of the opening buds of the mango and *vakul* (mimusops elengi).”†

b. “Two things were seized together by the hero treading like an

* For the legend of Urvas’í’s birth, See Prof. Wilson’s *Hindu Drama*, Vol. I. p. 202.

† Cf. the lines quoted by Mr. F. E. Hall from *Rámila* and *Somila* in *Journ.* Vol. XXVIII. p. 30.

elephant,—the throne of his father, and the circle of earth's monarchs." (Raghu Vans'a.)

Here some authors maintain that 'in the lines quoted above, the natural excellence belonging to the hair, &c. is described as supernatural by introsusception; since, otherwise, if you held that the hair &c. were really swallowed up by the peacock's tail, &c. [these being plainly different things,] the definition would not apply in such cases as the lines of § 2, "the grace of her limbs," &c. [as the grace here described is not *really* different.]' But this view is not correct, since even in this last instance the grace of her limbs, though really *not* different, is conceived, by introsusception, as if it were different. So too, if we altered the phrasology, and read instead of "verily *sui generis*," "as it were *sui generis*," it would then be a case of *utprekshā*, since the introsusception would be no longer definitely completed but only contingent and future. In the same way in the example quoted in § 5, "First indeed was the mind of the fawn-eyed maidens, &c."—the previous existence of the *vakul* blossoms, &c. is lost under the idea of their posteriority; but here too we should have an instance of *utprekshā* if we used "as it were." And so too in other cases."

It is this last paragraph which, as we observed in the beginning of the paper, is up to the present moment new to print, in spite of the two editions already published of the Sāhitya Darpaṇa. The MSS. used for the collation of the text (as, for instance, that in the Sanskrit College Library) were sadly deficient in this passage; and three or four lines were omitted which entirely destroyed the sense. We give below a correct copy of the whole paragraph from a MS. in the Society's Library.

इह केचिदाहुः "केशपाशादिगता लौकिकोऽतिशयोक्त्यलौकिकत्वेनाध्यवसीयते, केशपाशादीनां कलापादिभिरध्यवसायेऽन्यदेवाङ्गलावर्णमित्यादिप्रकारेषु अव्याप्तिर्लक्षणस्येति" तन्न। अत्रापि ह्यन्यद्-ङ्गलावर्णमित्यलौकिकत्वेनाध्यवसीयते। तथा ह्यन्यदेवेति स्थाने अन्यदिवेतिपाठेऽध्यवसायस्य साध्यत्वमित्युत्प्रेक्षाङ्गीक्रियते। "प्रागेव हृरिणाक्षीणां" इत्यत्र वकुलादिश्रीणां प्रथमभावितार्थं पश्चाद्भावित्वेनाध्यवसिता, अत एवात्रापि इवशब्दप्रयोग उत्प्रेक्षा। एवमित्यत्र।

The printed editions read *अध्यवसायेऽन्याङ्गीक्रियते*, and omit from *अन्यदेव* to *उत्प्रेक्षाङ्गीक्रियते*.

On the first and fifth kinds of *Atis'ayokti* another figure is founded called *Sahokti* (from *saha* 'with' and *ukti* 'speech.')

This is produced by the use of the word, 'with,' or any equivalent phrase, in connection with the exaggeration which is the especial object of Atis'ayokti itself. The last instance in the first class of the Sáhitya Darpaṇa, ("The lover also had *rāga* &c."), is thus an example of the two figures combined. We have an example of *Sahokti* in Byron's Giaour :

For courtesy and pity died
With Hasan on the mountain-side.

To illustrate the subject further, I add a translation of the account of Atis'ayokti given in the tenth section of the Kāvya Prakās'a,—an older treatise on rhetoric compiled by Mammata Āchārya, a Cashmirian Brāhman, about five centuries ago.

"Where the original topic is lost and swallowed up in something else,—where the original subject is viewed as itself changed,—where there is an artificial supposition by the force of if or its equivalent,—and where there is a contradiction of the priority and posteriority of cause and effect,—in these four cases we must recognise Atis'ayokti."

a. The first kind is where the subject of comparison is swallowed up in the object, as—

"A lotus but not in the water, and two blue lotuses in that lotus, and the three on a golden creeper;—and the creeper itself tender and dear! what a series of portents is this!"

Here the face, the eyes, and the form are swallowed up in the lotus, the blue lotuses and the creeper.

b. The second is where the original is lost by apparently becoming something else, as,

"Her beauty is something quite different, the aspect of her form is quite extraordinary; this S'yámá was not the work of a common Prajápati."*

* The Prákrit of these lines is obscure,

अपुं लउहत्तणञ्चं अस्या विश्व काइ वत्तणच्छाया ।
सामा सामस्यपञ्चावद्गो रेह्विञ्च ए होइ ।

(The metre is Aryá.) The Schol. thus explains them अन्यज्ञावणमन्यैव कापि वर्त्तनच्छाया । श्यामा सामान्यप्रजापतेरेखैव न भवति । लउहत्तणं लावण्ये देशे । वर्त्ततेऽनेनेति वर्त्तनं शरीरं । श्यामा तथापरिभाषितनायिकाविशेषः । रेखा शिल्पं । The S'yámá is technically defined thus श्रूते सुखोष्णसर्व्वंगी ग्रीष्मे तु सुखशोतला । तप्तकाञ्चनवर्णाभा सा स्त्री श्यामेति कथ्यते ॥

c. The third is where an impossible thing is supposed by the force of *if* or its equivalent, as—

“If the orb of the treasury of ambrosia (the moon) were void of spots at its full, then would her face endure the defeat of having its parallel found.”

d. The fourth consists in mentioning the effect *first*, to impress on the reader the rapid efficiency of the cause, as in these lines from the drama of *Málaviká* and *Agnimitra*.

“*Málaviká’s* heart was *first* possessed by the god with the flowery bow,—and then by thee, beloved of the fair, standing as the object of her eye.”

The Kírán-us-Sa’dain of Mír Khusrau.—By E. B. COWELL, M. A.

Among the poetical names of Muhammadan India, none stands higher than *Yamín-ud-Dín Abú’l-Hasan*, more commonly known as *Mír Khusrau*. His great fault is his boundless prodigality of authorship,—it is said that he has left behind him some half million of verses!

Amongst his various works, the most celebrated are his five *Masnavis*, in imitation of the *Khamsah* of *Nizámí*; containing the *Matla’ul-Anwár* on *Sufeyism* and morals, the loves of *Shírín* and *Khusrau*, *Lailí* and *Majnún*, the *Mirror of Alexander*, and the *Eight Paradises*, or adventures of *Bahrám Gúr*. But beside these better known poems, there are two of a different class, which are, for many reasons, much more interesting to a European reader. In his more ambitious poems, *Khusrau* had given the reins to his fancy, and let it carry him as it willed far away from the actual world into the ideal land of a remote antiquity; in the eras of *Shírín* and *Sekandar* he had no fear of facts or dates, every thing was lost in distance and obscurity, and the traditions could be moulded at his pleasure. He had indeed but followed the example of his predecessors; all Persian poets in their narratives had similarly thrown themselves into a legendary past, and it is only in their smaller lyric effusions, that we can trace the lights and shadows of their own time. But in two of his poems,

as we have said, Mír Khusrau strikes out a new line for himself; and he is, we believe, the *first*, and we might almost add the *last*, of his country's poets who has been bold enough to look away from the past to the present, and seek for his inspiration in the actual scenes transpiring before his eyes.

He lived in a stirring time. His father was a military chief of the Pre-Moghul empire, and fell in battle when his son was nine years old. Khusrau was born A. H. 651 (A. D. 1253,) and he died A. H. 725 (A. D. 1325.) For many years he was attached to the court, and he shared many of the adventures of his royal patrons. He was contemporary, in his youth, with the last Slave Kings, and he outlived the whole Khilji dynasty. He had been born under Násir-ud-Dín, and his early patron was Prince Muhammad, the 'Black Prince' of Indian history, whose valour and taste and untimely death throw such a colour of romantic interest round his father Bulbun's court, in spite of his mean jealousies and tyrannical policy. He was at the court when the revolution took place, by which the sceptre passed from the Slaves to the Khilji dynasty, and he saw the whole course of Alá-ud-dín's strangely eventful career,—beginning with the basest ingratitude and murder, and ending Lord of all India, with a wider empire than any of his predecessors; though that empire was not fated to remain in his family, but passed soon after his death to a stranger. Nor was the aspect of India itself less stirring than the changeful history of its Kings. When Khusrau was born, the great storm of Moghul invasion which had devastated all central Asia, was still threatening from the North-west. He was five years old when the tidings came which spread a thrill of horror through the Muhammadan world, that Baghdad was taken and the last of the Caliphs slain by the idolaters! He saw Alá-ud-dín's adventurous plunge into the unknown forests of the Deccan, and he lived to see Warangol taken in 1323, the last Hindu kingdom of the South subverted and its Rájá brought a prisoner to Dehli!

Living then, as he did, in such a busy time, we need not wonder that a man who with all his faults was a true poet, could see materials for romance in the present around him, as well as in the legendary glories of Alexander and Chosroes. Two of his poems have, for their subjects, scenes which he had either witnessed or heard of from

others who witnessed them,—the story of the contest between the Sultan Kai Kobád and his father, and that of the Mahratta Princess Dawal Devi, and her marriage with the crown princee Khizr Khán.

We have a copy of each of these poems in the Society's Collection ;

1. No. 541. قران السعدين, 163 foll. 12 lines in a page.*

2. No. 990. عشيقه امير خسرو, or, as it is sometimes called, قصه خضرخان و دول راني,—it contains 4200 baits.

The present paper will confine itself to the former poem, the latter may be similarly taken up at some future opportunity.

Dr. Sprenger has given a brief notice of the *Kirán-us-Sa'dain* in his Catalogue of the Oude MSS. but his account lacks his usual accuracy, as the more detailed analysis in the following pages will sufficiently testify. He says of it that "It is an historical poem, the heroes are Násir-ud-Din and Moizz-ud-Din, but the facts are so much clad in allegories that the only historical value of the book is, that it offers us a specimen of the singular taste of the age in which it was composed." The style of the poem (as of all Khusrau's works) is full of exaggeration and metaphorical description, but the facts of the history are generally given with tolerable fidelity. In fact, few historical poems in any language adhere more closely to the actual order and character of the events, and when we compare Ferishta's account with the poetical version, we are struck by their great agreement in the main points.

The poem is composed in a singular form, and I do not remember any Persian work from which Khusrau may be said to have borrowed it. The main body of the poem is like an ordinary Masnavi, as for instance any one of Khusrau's own Khamsah, composed in the Metre — 0 0 — — 0 0 — — 0 —

Jane pater Jane tuens, omnium

Principium fons et origo Deum ;

but the rubrics of the different Chapters are (like those in Spenser's Faery Queen) in a different metre

— 0 — — 0 0 — — 0 0 — — 0 0 — †

* The *Kirán-us-Sa'dain* was lithographed, with a commentary, at Lucknow, A. H. 1261, but, since the mutiny, copies have become very scarce.

† Dr. Sprenger, not observing this peculiar novelty, has apparently confused these two different initial lines of the poem.

each forming a couplet of a continuous *Kasída* in the rhyme *ai*, which if collected together would, of course, supply a running analysis of the whole poem. Beside this, every now and then at the end of many of the chapters there is given a *ghazal*, which is supposed to express the poet's feelings, contemporary with that part of the story which has been just described, something like the songs introduced between the parts of Tennyson's *Princess*. These *ghazals* are in various metres and serve admirably to diversify the poem, while at the same time they form a running commentary, like the choruses of a Greek play, on the progress of the action and the hopes and fears which it may be supposed to excite in the minds of the spectators. The poet, having been actually present throughout the campaign, is in this way enabled to throw himself into the scene, and we have thus an interesting mixture of the epic and lyric elements, each portion of the action being represented from an objective and a subjective point of view.

The first couplet of the *Kasída* Analysis is

شکر گویم که بتوفیق خداوند جهان بر سر نامه ز توحید نوشتم عنوان

but the opening lines of the poem itself are

حمد خداوند سرایم نخست تا شود این نامه بنامش درست
واجب اول بوجود قدم نی بوجودی که بود از عدم

The usual praises follow to the Prophet and his family, and fill several chapters; then come the praises of the Sultán Moizz-ud-Din Kai Kobád in two chapters, followed by a description of Dehli and the Jámí' Musjid and other public buildings, &c.

At last, after this tedious series of preliminaries, the story itself opens with a description of December, "when the king of the sky lays his hand on the bow and shoots an arrow on the world in frost." A curious episode follows on the various means of exciting warmth in the cold season, by fires, warm clothes and festivities; and the young king adopts the last remedy. His realm is in peace, no sounds of war are heard, "the face of the earth is controlled under his sword as the dust of the ground is laid by the cloud." His carousings are rudely disturbed by news from the East, of his father's meditated revolt. Násir-ud-Dín (or, as Ferishta calls him, Baghrá Khán,) had hoped to succeed his father Ghaias-ud-Dín Bulbun when the eldest son Muhammad died, and had been grievously disappointed when the

old man fixed his choice on his grandson,—like Laneaster and Richard II. in our own history. Bulbun died shortly after, a broken old man, and civil war seemed imminent, when the dispute was settled by both the rivals retiring and leaving the vacant throne to Násir's own son, Kai Kobád; the son of Muhammad contenting himself with the Government of the Punjab, and the young King's father returning to his old province of Bengal. But his ambition was only stifled for the time, and the tidings of his son's incapacity and follies stirred it into new life; and he prepares to wrest the sceptre from his feeble hands.

Fierce blew the rumour that the Sun of the East
 Has blazed like lightning across his meridian,
 The Násir of the world, the conqueror of kingdoms,
 Has drawn his sword seeking revenge.
 He marched his army to the river of Hind,
 That his host might raise up the dust of Sind.*
 See his fortune what ambition it awoke,—
 The descending water inclines to mount up!

His army proceeds by land and by water into Oude and occupies the province.†

Night and day, his one speech is this,
 "I am the Sekandar that shall break down Dára.
 If my father is gone, then am I the world's keeper,
 I am the heir of Sulaimán's diadem."

The King awakes from his dream, and prepares for the contest. He summons his various governors and jágírdars to supply their contingents, and a large army is soon collected from every quarter. If we could rely on the poet's accuracy in statistics, we could copy a roll call which he gives us; but we fear his laks are somewhat indefinite, like the sands and "sandillions" of older poets! Khusrau concludes his chapter by a warlike ghazal.

On "Monday in the early morning, in the month of Zúl Hijjah, at the end of the moon," the king first shakes his banner to the breeze, and begins his march from Dehlí. He proceeds leisurely by slow

* So the MS., the printed ed. reads

راند زلكهتوتی و دریای هند تا سپهش گرد بر آرد زسند
 آمد و اقصای اود در گرفت وان همه اقلیم سراسر گرفت †

marches and his time is chiefly occupied in festivities and hunting-parties. The action of the poem now moves very slowly too, and we wade painfully through a long series of descriptions, the varying scenery of every month being minutely described, and the different employments of the young King and his courtiers. His first stage is Kílú Kharí (کیلو کھری) where a grand castle, belonging to the King, is described, as well as the festivities in which he indulges on his arrival. While lingering here, he receives news of the invasion of his North Western territories by an army of Moghuls.

By the violence of their torrent as it burst in,
The glory (آب) of Láhore passed over to Multán.

The king despatches 30,000 chosen horsemen to meet this new foe under the command of an officer named Khán Jahán Bárbik.* They march to the Punjab and soon disperse the enemy. We have the names of several of the Moghul leaders mentioned, such as Tamur (تمر), Sarmak, Kílí, Khajlik and Baidú.

سرمک و کیلی دو بیکرو شتافت خچلک و بیدو بدگر سو شتافت

These transitory but desolating Moghul incursions are a continual feature in the Indian annals of this period, reminding us of those devastating inroads by the Danish pirates in our own Saxon period. We learn from Ferishta that such an invasion actually occurred at this time, and the poet has strictly kept to truth in narrating it; but he omits to mention, what is little to his hero's credit, that alarmed lest the many Moghul soldiers in his service should side with their countrymen, he assembled their chiefs and had them treacherously put to death,—a singular parallel to Ethelred's murder of the Danish huscarles in a somewhat similar juncture.

When the Sun entered the bull (the signs of the Zodiac forming the poet's usual calendar,) the king seems to have commenced the campaign in a more business-like manner, and he makes his second start in the middle of the month Rabí'ul-Awwal.†

برسر شان باربک تیغ زن خان جهان چابک و لشکر شکن *

Ferishta gives Khán Jahán and Mullik Yarbeg (in the printed text باربیک Birlás as the leaders. General Brigg says elsewhere that Bárbik is a Turkish title for one of the classes of the gold stick; it may be rendered by the title "gentleman usher in the courts of Europe." (Ferishta, i. p. 281.)

† This month began April 16th in the year A. H. 686, A. D. 1287.

کوه بیدک سوی و دگر سوی چون هردو شد از گرد سیه تیره گون

The pomp and circumstance of the march are of course not allowed to pass by unnoticed, but we may leave them to the readers of the original. The first halt is made in the district of Talpat and Afghánpúr, a district, according to the Scholiast, five or six eos from Dehlí, and there we have the old revelry renewed. It is singular to see by these ever-recurring scenes of dissipation and excess, how even the ideal descriptions of the court poet are bound down to the coarse actual world around him,—these days and weeks of debauchery being constantly referred to by the historians of the time as one main evil of the young king's reign, and as, in fact, ultimately leading to his early and miserable fall.

At this place, the court is enlivened by the arrival in the camp of 1000 Moghul prisoners from the Punjáb. The poet knew only too well the savage cruelty of these barbarians, for he had passed two years in captivity among them in Balkh, having been taken prisoner in the battle a few years before in which his patron prince Muhammad, then Governor of Cábul, had been killed. These captives are minutely described, the Tartar features, the high checkbones, flat noses, yellow hue, &c.* are dwelt upon with the exaggeration of the poet's hatred, and he evidently gloats on the fact, that they were all put to death by the royal order.

It is difficult to trace the King's route, as so few indications occur to define it, but we find the army starting from this last place and after two marches reaching the Jumna.

ماه علم بعد دو منزل بعون عکس نما شد بلب آب چون

The next stage mentioned is the city of Jaipur (جیپور); here Bárbik is sent forward with part of the army to the river Sarú. There

* The description is so curious that I subjoin part of it.

روي چو آتش كله از پشم ميش	آتش سوزان شد با پشم خویش
رخنه شده طشت مس از چشم تنگ	دیده در انداخته در رخنه سنگ
چهره شان دبه نم یافته	جای بجا کچلک و خم یافته
از رخ تارخ شده بیذی پهن	وز کله تا کله لب لب دهن
بیذی پر رخنه چو گور خراب	یا چو تذوری که ز طوفان پر آب
موی ز بیذی شده بر لب فراز	سبلت شان گشته بغایت دراز
ریش نه پیرامن چاه زنج	سبزه کجا بردم از روی یخ

he is joined by several Zamindars with their contingents, among them by Chahjúí the Amír of Karrah,* and the Khán of Awiz (عوض).

The father now determines to send a messenger to try his son's temper, to see if his thoughts be those of peace or war,—he accordingly sends a trusty ambassador named Shams Dabír. An interview takes place between the messenger and Bárbik, but of course little but idle compliments and threats passes between them. In the meantime the king continues his leisurely marches varied with the same round of festivities. At length he reaches and crosses the Ganges and enters the province of Oude. The sun at the same time enters Gemini, and we have a very elaborate description of the hot weather, but the poet represents the army as marching on without suffering any inconvenience, 'not a soldier knew aught of the heat of the sun, under the canopying shade of the king, the Shadow of God!' He at length reaches the city of Oude and encamps by the river Gogra.

نصب شد اعلام شهنشاه دهر بر لب گهگر بحوالي شهر
 گهگر ازین سو و سرو زان طرف ازتف لشکر بلب اورده کف

Here follows a striking incident,—the first meeting of the father and the son. The son is on one side of the river with all his troops, the father with his troops on the other. The father bursts into tears as he sees his son in the distance and sends a messenger across in a boat. "Carry," he bids him, "the news of a father's tears to him who is dear to that father as the apple of his eye." The son recognises the messenger from the opposite shore, but a feeling of evil pride rises in his bosom and he shoots an arrow at him, forbidding him to advance, and the messenger has to return without delivering the message. Thus ends the first interview.

The father then sends a more official ambassador who delivers a formal speech, chiefly upbraiding the king for his youth and indiscretion, and trying to recal him to a sense of filial duty. This message is delivered in full durbar, and the young prince haughtily answers it,—his claim is that crowns come not by inheritance but by fate,

* We read in Ferishta that "Mullik Jujhoo, the nephew of Ghaias-ud-Dín Bulbun, assumed royal privileges in his government of Karrah," during the confusion which followed the accession of Jalál-ud-Dín Khilji.

—besides, he has a peculiar right to the throne from the choice of the old king, his grandfather.

The father, on hearing, at his messenger's return, these stormy words, "drooped his ear like a shell in the sea," but on maturer thought determined to send another messenger who might speed better in his mission. He accordingly despatches a very impersonation of Machiavellism—"a messenger he, who spent his whole life in discourse fine as a hair—if a secret came before him finer than a hair, he cleft its finest point with his keen wit." In this address the father assumes a bolder tone—he appeals from contests of the tongue to that of the sword—he boasts of the number and bravery of his forces, and especially the number of his elephants which he contrasts with the other's cavalry. He admits that his father *did* leave the throne to his grandson, but he maintains that it was the grandson's part to yield it up to the true heir. He concludes with a challenge,

If thou bindest firm the girdle of hatred
I will enter ere thou dost on the conflict;
Or if this interchange of words leads to kindly feeling
I will not turn my face from thy sincerity;
But on this condition that, according to my design,
I take my father's place and thou take mine.

The young king easily repels his father's boasts of his elephants and extols his own cavalry—one of his arguments being a curious one—in chess an elephant (or bishop) is worth less than a knight.

بدين كه بشطرنج هم استاد كار پيدل كم از اسپ نهد در شمار

However with all this he feels his inferior place—he owns the moral untenableness of his position.

With all this strength and might of my army
I do not wish to harm my lord.
I am not equal to thee in the battle
Though I could sew Mount Káf with my javelin as a needle.
It is an evil rumour on the lips of men and women,—
The wrath of a child against his father.
The sword which Sohráb drew against Rustam,—
Hast thou not heard what he found from fate?
If the jewels of peace could but be strung,
With hearty goodwill would I bear the ring in my ear as thy slave.

He tries to justify his still occupying the throne, but with a faltering argument, and thus concludes,

But if in very truth this desire is in thy heart,
I am thy slave—'tis thine to command.
Thou askest for me my crown that touches the sky,
Come and meet me that I may throw it at thy feet.

This message a little touches the father's heart and he now disclaims all idea of seizing the throne.

What though I could take the throne from thee?
If I took it from thee, to whom should I give it?

He then expresses his loyalty and devotion in a style of truly oriental hyperbole and concludes by begging an interview. The son dictates an answer—"What though my crown reaches to the moon? my head shall be under thy foot." The father receives it with great joy, and sends his second son Káús with a reply and many magnificent presents.

The brother proceeds to the king whom he finds in all his magnificence, which is well described. He advances to the throne and "when the king's eye fell on him, straightway he recognised himself in that mirror; in haste he leaped from the lofty throne and seized his princely form in a close embrace." He seated him by his side on the throne and treated him with the most cordial affection.

The next day early the king calls for his own son Kaiomars (then quite a babe) and sends him to his grandfather with many rich presents,—with him he sends an experienced councillor to carry the secret instructions, and the two set off to the prince of Bengal.

They crossed the water—they went to the king of the East,
Like rose and nightingale they went to the garden.
The news came to the king of the realm
That those fresh fruits are coming from the orchard.
He went and sat on his Sakandar-like throne
And with lines of elephants built up a Magog's wall.

The governor descends from his throne and meets his grandson as he enters his presence, and leads him to his seat where he places him by his side. He is at first absorbed in the pleasure of seeing his grandson, and totally neglects the minister and the presents, until his eye happens to fall in that direction, when he recalls himself

from his pre-occupation. The minister then presents his message, and, after a very lavish interchange of gifts, the great interview is fixed for the morrow and the two return to the king.

On the morning of the day every body is astir—the whole day passes in busy preparations—until evening draws near.

When the day waned to its close and the sultry heat had passed
And the sun was about to sink into the ocean,
The king of the East to cross the river
Asked for a boat swift as the revolving heavens.

The description of this boat fills half a chapter and then follows the meeting. The prince of Bengal crosses.

The prince's boat flew swifter than an arrow
And in the twinkling of an eye crossed the river.
Soon as he had touched the shore
He saw his pearl on the bank of the stream.
He longed in the agitation of his restless heart
To leap ashore and clasp it to his bosom.
He sought for patience, but it came not to him,
He sought not for tears, but lo! they came.
On the other side stood the King Moizz-ud-Dín
With all preparations of courtesy after the manner of kings.
When the king's eye fell on his bewildered visitant,
The more he gazed, the more bewildered himself became,
He rushed forward and scattered a donative of tears,
He flew to meet him and clasped him in his arms.
Each locked the other in a close embrace,
Each lingered long in the other's arms ;
Like rose and rosebud when they leap forth from winter,
This parts not from that, nor that from this.

A tender dialogue ensues between them and all their jealousies and suspicions are soon set at rest in mutual confidence and affection.

The poet himself looked on the scene amid the crowd of courtiers, and he expresses his own feelings in a triumphant ode of joy, beginning :

Kappy the moment when the lover gains the beloved.

The best couplets are the following.

None knows the joys of presence but he the sorrow-consumed one
Who after long exile reaches the beloved.

None knows the worth of the rose but he the captive bird
Who has felt the cold of winter and *then* beholds the spring.

As a specimen of the series of Ghazals which, as we have said, are continually interspersed through the narrative, we subjoin it in the original.

غزل

خورم آن لحظه که مشتاق بیاری برسید
 آرزومند نگاری بنگاری برسید
 دیده بر روی چو گل بندد و نبود خبرش
 گرچه در دیده زنونک مزه خاری برسید
 تن چو بیدنش که برسیل مزه کشتی راند
 از پس قطع سواحل بکناری برسید
 لذت دیدن دیدار بجان کار کند
 جان بیکار شده باز بکاری برسید
 گرچه در دیده کشد هیچ غبارش نبود
 هر کجا از قدم دوست غباری برسید
 ای خوشا تلخئی پاسخ که دهد بعد از هجر
 که خماری شکن از مهر خماری برسید
 لذت وصل ندارد مگر آن سوختنه
 که پس از دورئی بسیار بیاری برسید
 قیمت گل نشنا سد مگر آن مرغ اسیر
 که خزان دیده بود پس ببهاری برسید
 خسروا یارتو گرمی نرسد خود میگو
 بهر تسکین دل خویش که آری برسید

We have next an account of the mutual gifts of the father and son, and the splendid entertainment which followed, and here the action of the poem may be said to terminate. The remainder 'drags its slow length along' through a wilderness of extraneous matter and irrelevant description.

The poet first describes the night of the festivity, then follow chapters devoted to the taper, the lamp, the 27 mansions of the moon, and the astrological position of the heavenly constellations at the hour of the "conjunction of the two auspicious planets" of the earth. After this we have a curious series of chapters on the wine, the flaggon, (صراحی) the flask (قرابه) the cup, the cupbearer, the harp, the *Kásrabáb*, the pipe, the tabour, the singers, the festal board, the betel, &c., and the king's crown and throne. Several

similar interviews are described, and in one of them the father takes an opportunity of instilling into his son's ear some salutary counsel as to his future reign, while in the parting visit he is represented as warning him against certain evil counsellors.* We know from the narrative of Ziá Barní that such was actually the case, but the poet only gives us vague generalities where the historian adds a contemporary edge.

The Sultan returns to his capital in the rainy season, which is described, as each of the other seasons have been, at great length. Then follows a very pleasing and natural chapter of the poet's personal history, the best in the whole book.

He had accompanied the royal expedition and had been an eye-witness of many of the scenes described, but he returns with it only as far as Kantipúr. His immediate patron† had just received a jágir in Oude, and the poet stays behind with him and remains two years there. At last however he wishes to return to his family at Dehli, and after some time he obtains leave, of which he gladly avails himself. After one month of weary travelling, he reaches the imperial city in the month Zú'l Ka'dah, and he describes his joy at meeting his aged mother and his friends. Two days after the king hears of his arrival and sends for him to court, where he is appointed to an office about the royal person. The king then in a private interview condescends to ask a favour. The poet expresses his astonishment at such condescension, and then the king bids him write in verse the history of the meeting of the two Sultans, "the conjunction of the two auspicious constellations of the time;" that he may divert his mind by its perusal while parted from his father, who of course remains in his quasi independent province of Bengal. From this command the poem itself took its birth. Khusrau tells us that it

دور مپندار فلانرا زپیش خاص مکن آن دگیرا بخویش *
درحق این شو بکرم ره نمون واین دگیرا بزمدن ریزخون

† His patron's name is given as

خان جهان حاتم مفلس نواز

Amir Ali was Khusrau's patron at Dehli after the death of prince Muhammad, and we learn from Ferishta that in the beginning of Jalál-ud-Dín Khilji's reign, Amir Ali was "holding the government of Oude under the new title of Hátim Kháu."

occupied him six months, it was finished in the month Ramazan of the year A. H. 688 corresponding to our A. D. 1289. The poet was then in the 37th year of his age and the number of baits in the poem he states to be 3944.

Then follows a description of the king's triumphant entry into his capital, and in the closing chapter the poet expresses himself as weary of making poetry, and declares, that he did not write the poem for the sake of gold but *fame*. "If the king gave me the treasures of Farídún and Jamshíd, they would be a poor payment for one letter, my desire for this highly decorated book is that my name may remain high in its place." The poem then ends with the usual moral reflections on the vanity of wasting life in the composition of verse and devotion to earthly objects.

Nor are these last commonplaces wholly inapplicable. The book is curious, rather for what it professes to be, than for what it *is*; it reminds us too much of what it *misses*, to be really a good poem. We read the simple account in Ferishta's plain prose, and we feel that the poet would have shewn a truer knowledge of his craft, had he kept closer to the actual facts as they occurred; and, little as he *has* deviated from them, every deviation is a positive blemish in his work. We miss too in the poem the evil genius of the true history, the treacherous vizier Nizám-ud-Dín, whose secret machinations had produced the lamentable rupture from the first. The poet's moral cowardice could only venture to disguise this power "behind the throne," and his characters act without sufficient motives in his pages; he dared not depict the arch villain* of the court, for the vizier had returned to Dehlí in unbroken influence with the king. It was he who had endeavoured, by every means, to exasperate the parties into an open rupture, and to stop every attempt at pacific negotiations; and when Baghrá Khán had appealed too strongly to his son's unhardened heart to be wholly unheard, the vizier had endeavoured to frustrate all the good effects of the interview. He had drawn a line

* The only allusion to him in the poem is perhaps in certain secret instructions and counsels of state which are two or three times mentioned in the interviews between Kai Kobád and Násir-ud-Dín. Zíá Barni' gives long secret dialogues between the king and his father, where the latter warns his son against the minister's treachery.

of humiliating ceremonies round the king to chill the paternal heart from the approach. "To all these the prince submitted; until after repeated obeisances he found the king remaining unmoved on his throne, when, shocked by this unnatural behaviour, he burst into tears. This sight overpowered all the king's resolutions; he leaped from his throne and ran to throw himself at his father's feet; and the father hastening to prevent him, he fell on his neck and they remained for some minutes weeping in each other's arms, while the whole court was almost as much affected as themselves." One feels that there is nothing in Mír Khusrau's *poem* one half so truly pathetic as this plain prose; it is one of those touches of nature which make the whole world kin, but which Mír Khusrau completely overshoots in his endeavours to be original and sublime.

There is only one observation more, and that relates to the final issue of the dramatis personæ. We read that the poet wrote for the king in the year 688, but in that very year* the king murdered the vizier who had been such an evil guide for his youth. Cowed by that superior will, he dared not openly to assume his authority, and he could only turn to the poison bowl to rid him of the too powerful servant. But his own hands were too enervated to seize the reins which the dying minister dropped; the whole empire relapsed into confusion, and the great military chiefs openly contended for the falling fragments. The dissolute young king found himself utterly powerless in the midst of the confusion which he had evoked, and he was soon assassinated in Kilú Khari, the scene of so many of his revelries; and one of these Turkish chiefs, Jelál-ud-Dín Khilji, mounted the vacant throne. A party in the court endeavoured to secure the crown for the little child Kaïomars whom we watched on his baby mission to his grandfather in Bengal; he was then an infant in arms, and he is even now only three years of age; but the attempt fails, and Khilji's first exercise of power is to sweep the poor child for ever out of his path. Baghrá Khán retained Bengal through *these* confusions as through the last, and thirty-six years after, we still find him there, as Ghaias-ud-Din, the founder of the Toghlok dynasty, confirms him in his government.

* Ferishta gives 687 as the last year of his reign, but this must be wrong.

Ornithology of Amoy.—BY ROBERT SWINHOE, ESQ.

The position of Amoy Island and its relative bearings to the mainland of China may be ascertained from any ordinary map. A few words will therefore suffice to explain the nature of the country in which I have followed my favourite pursuit. This island, the neighbouring shore of the mainland, and the banks of both the rivers (the chief one leading to Changchow Foo and the other to Tunggan Hien) are all densely populated, and have remarkably little wood excepting occasional banyans thriving in the midst of villages. The plains are well cultivated and planted for the greater part with rice, maize, sugar-cane, *Cucurbitaceæ*, and hemp during summer, and *bearded wheat*, spinach (*Basella rubra*), taro, cabbages, and peas during winter. The hills are either composed of granite debris studded with large black blocks of granite and extremely barren, or of clay; and are covered with small stones and scanty herbage. The character of the country will probably account for the paucity of our resident species among *land birds*, as compared with the occasional visitants or stragglers in the same group.

The water-birds, however, shew a finer list of winter residents, no doubt owing to the suitable feeding-ground afforded them by the large mud-flat of the Amoy creek, those of several other inlets and creeks into the mainland, and the marshes at the mouth of the rivers.

In identifying the following birds, Mr. Blyth of Calcutta has rendered me much service, and indeed without his valued aid I could have done little among the non-European forms. I have also to thank Mr. Stevenson of Norwich for the help which he has afforded me; and Mr. G. Schlegel at Amoy, son of Dr. Schlegel of the Leyden Museum, merits my warm thanks for the loan of a copy of the *Fauna Japonica*, from which work I have gained considerable assistance.

Amoy, 19th November, 1859.

Ornithology of Amoy. China.

(Classified according to Dr. J. B. Hay's Catalogue of Genera.)

1. *Buteo vulgaris*, var. *japonicus*, Temm. and Schleg., *Faun. Japon.*

A regular winter visitant.

2. *Pandion haliaëtus*, (L.) ?

Lives on the rocks at the mouth of the harbour and comes occasionally to Amoy, but is very shy and unapproachable. I have never been able to procure a specimen.

3. *Falco peregrinus*, (L.)

Breeds in the neighbourhood and is not unfrequent.

4. *Hypotriorchis subbuteo*, (L.)

Rare.

5. *Tinnunculus alaudarius*, Brisson.

A common resident.

6. *Milvus govinda*, Sykes, var. *melanotis*, Gray. Faun. Japon.
[*Ante*, p. 95.]

Very common, especially in the harbour.

7. *Accipiter nisus*, (L.) ?

Rare. Differs from the European bird chiefly in having *white* axillaries, as well as in many minor points.

8. *Micronisus badius*, Gmelin.

Received from Fouchow, and shot in Amoy, November of this year.

8. *Circus cyaneus*, (L.)

Pretty common.

9. *Circus æruginosus*, (L.)

Very common up the rivers.

10. *Ninox scutellatus*, (Raffles.)

A straggling winter visitant, common in summer at Fouchow where it breeds. The immature plumage is brown, banded with ochreous.

11. *Bubo maximus*, Sibbald.

Occasionally seen of a winter's evening. Breeds somewhere in the neighbourhood, as every early spring the young are sold in the streets of the town.

12. *Ephialtes bakkamæna*, Pennant.

Rare. I procured two one winter, one mottled brown on the upper-parts, the other mottled buff; the first I take to be the immature plumage, as both these examples were females. Mr.

Blyth informs me that this is not an uncommon species in the vicinity of Calcutta.

13. *Caprimulgus dyticeivorus*, nobis. [*C. indicus*, large var., Blyth, *J. A. S.* XIV, 208; the small var. there also noticed being *C. Kelaarti*, Blyth, *J. A. S.* XX, 175, from the Nilgiris and mountains of Ceylon.]

This species is closely akin to the *Caprimulgus jotaka* of the *Fauna Japonica*; the following being the most striking points of difference. Our's has the wing $\frac{1}{2}$ inch longer and the beak 2 lines longer. Instead of the 2nd, 3rd and 4th quills in the male having a white band, our's has a white spot on the inner web of the 1st, and a band across the 2nd and 3rd only. The sides of the head, greater and lesser wing-coverts, and scapularies are frosted with white, and a narrow line of frosted white runs from the bill to the top of the eye and extends in a broken manner beyond. In most other respects it resembles *C. jotaka*, the tail is banded with white pretty much in the same style; and the tarsus is feathered to the base of the toes. It stays in Amoy the greater part of October and November, and is there seen hawking over paddy-fields for water-beetles which fly at night. Out of the stomachs of birds shot I have repeatedly taken out whole individuals of *Dyticus marginatus*, and in one instance *two* perfect specimens were so found, but with the hind-legs reversed, apparently with the intention of affording no impediment to the passage of so large a beetle down the *oesophagus*. This species breeds at Fouchow.

Another and smaller species is met with in a copse about twelve miles distant from Amoy during the months of September and October. It has *naked* tarsi, is 10 inches long and has the lateral tail-feather white except just at the tip. The 1st and 2nd quills are blotched with a large spot of white on each, and two white spots occur on the throat. A yellowish circle girts the eye. Not having been able as yet to identify the species, I have named it *passim*.

14. *Caprimulgus stictomus*, nobis. [Akin to *C. monticolus*, Franklin, and *C. affinis*, Horsfield; but much richer in colouring, *E. B.*]
 15. *Cypselus vittatus*, Jard. and Selby.

Frequent in spring, flying high in fine weather, but darting about low during rain. Does not build here.

16. *Cypselus subfurcatus*, Blyth. [*Ante*, p. 95.]

A permanent resident, associating in parties and twittering together at a great height in the sky, then, suddenly separating, the birds dart to all quarters, each displaying its command of wing in the chase after insects; then, again, they meet as before, and so on for the greater part of the day, seldom resting. The nest is often placed under the rafters of verandahs, and resembles that of the House-Martin (*Chelidon urbica*) at a distance; but is composed of straw and other soft materials glued together in regular layers. The old birds roost every night in their nests all the year through.

17. *Hirundapus nudipes*, Hodgson.*

A straggler in spring during rain-storms.

18. *Hirundo rustica*, L., var. *gutturalis*, Scopoli.

This appears to be merely a degenerate variety of the European species. It is a summer resident here and pretty numerous, building mud-nests shaped like a half-dish, and lined with straw and a few feathers, over the doors of Chinese huts, where they are revered as the harbingers of good luck.

19. *Hirundo daurica*, L.; *alpestris*, Pallas.

A few passing flocks spend a day or two in Amoy during winter. In Formosa it takes the place of the common species, and builds domed nests of clay and mud under the roof-tops. Those nests are lined properly with feathers, and contain from 3 to 5 fine white or pinkish eggs.

20. *Eurystomus orientalis*, L.

Very rare.

21. *Halcyon smyrnensis*, L.

A common resident; called "Fei-tsuy" by the Chinese, who glue the feathers, chiefly those of the wing, over ornaments worn by their women. Thus treated the lustrous blue feathers give the appearance of turquoise stone. The bird is shy and is remarkable for its loud screeching cry.

* A specimen since sent accords exactly with Gould's figure of the Australian species; but I consider the latter not to differ from the Himalayan.—*Cur. As. Soc*

22. *Haleyon atricapilla*, Gmelin ; *pileata*, Boddäert.

Rarer than the preceding ; its feathers are also used for ornaments, to which they give a deeper tone.

23. *Alcedo bengalensis*, Gmelin.

A very common resident and generally known as the " King of the Shrimps ;" called by Amoy Chinese *Ang tony mng*.

24. *Ceryle rudis*, L.

Very common on the river ; where it rises on the wing at a height above the water, and drops suddenly on its scaly prey. I have also seen it strike obliquely when flying close to the surface of the water.

25. *Upupa epops*, L.

Stays all the year and is nowhere common ; builds in the holes of walls and exposed coffins ; is called by the natives the Coffin-bird, and flies with long undulating sweeps.

26. *Orthotomus phyllorapheus*, n. sp. [*Ibis*, Vol. II, 49.]

Length $4\frac{1}{2}$ inches ; wing $1\frac{9}{10}$; tail 2. Bill along culmen $\frac{1}{2}$; to gape $\frac{7}{10}$. Tarsus $\frac{8}{10}$; mid-toe $\frac{6}{10}$; hind-toe $\frac{5}{10}$; outer toe rather longer than the inner. Bill pale flesh-colour, along the ridge dark hair-brown. Legs and toes pale yellowish-brown. Iris buff ; narrow circle round the eye, pale buff. Forehead ferruginous, gradually changing to olive-brown on the head. Back bright olive-green. Wings and tail hair-brown, the coverts margined with olive-green, and the quills with yellowish olive-brown. Round the eye and all the under-parts, including the shoulder-edge, ochreous-white, darker on the flanks, and buff on the tibiæ. The two central tail-feathers of the male gradually lengthen at the commencement of spring until May, when they are about $1\frac{1}{2}$ inch or so longer than the others, which are all somewhat graduated. I observe that these lengthened feathers soon become worn and usually drop after the first nesting, to be replaced by others scarcely longer than the lateral ones.

Mr. Blyth remarks—" Your *Orthotomus*, I think, is new, and constitutes the 12th species (!) now to be recognised. The other 11 are described by Mr. F. Moore in his monograph on the genus, read before the Zoological Society, 28th February, 1854."

This bird is usually seen in pairs, and is very common in most

bushy places. Besides at Amoy, I have also observed it at Hongkong and Fowchow.

27. *Prinia sonitans*, n. sp. [*Ibis*, Vol. II, 50.]

I have named this from the crackling noise it produces when hopping or flying from twig to twig.

Length $5\frac{3}{10}$; wing $1\frac{7}{10}$; tail 3. Bill along culmen $\frac{9}{20}$, to gape $\frac{5}{10}$. Tarsus $\frac{8}{10}$; middle toe $\frac{3}{20}$; outer slightly longer than the inner, hind-toe $\frac{5}{10}$. Bill and inside of mouth black. Irides orange-yellow. Legs buff, browner on the claws. Head fine deep bluish-grey; chin and cheeks white; occiput and back olive-green, blending with the grey towards the fore-part and becoming tinged with sienna on the rump. Wings light hair-brown margined with buff olive-green. Tail pale brown, margined and tinged with buff olive-green. Breast a clear pale buff tinged with primrose, deepening on the under-parts and very deep on the thighs.

The female has the head less bluish than the male; and in the young the head is uniform with the back.

This species is resident here, and builds domed nests on the stalks of reed-plants; the eggs, 7 or so in number, are strangely red. Mr. Blyth remarks on our bird—"Your *Prinia* from Amoy comes exceedingly close to *P. flaviventris*, Delessert, which is common in the Bengal Sundarbans, Tenasserim, &c., and I have received it also from Singapore; but yours has a longer tail, wants the bright yellow of the lower-parts below the breast, and there is an admixture of white in the loreal region and ear-coverts not seen in our species. Moreover, *Pr. flaviventris* lays a similar red egg, as I am informed by Major S. R. Tickell."

28. *Drymoica extensicauda*, n. sp. [*Ibis*, Vol. II, 50.]

A common resident, and seems to delight in fields of grain, long grass, &c. It is often seen standing on a stalk, throwing up its tail and twittering a short series of unmusical notes.

Length $5\frac{1}{10}$; wing $1\frac{9}{10}$; tail $2\frac{1}{2}$, long and graduated deeply, the outer feather measuring only $1\frac{3}{10}$. Bill along culmen $\frac{4}{10}$, to gape $\frac{6}{10}$; deep blackish-brown, paler just at the tip, and yellowish flesh-colour at the base of the lower mandible; inside

of mouth pale flesh-colour. Iris orange-yellow, margin of eyelids buff. Tarsus $\frac{7}{10}$; middle-toe $\frac{7}{20}$; outer toe slightly longer than the inner which is $\frac{9}{20}$; hind-toe $\frac{11}{20}$; legs yellow-ochre, flesh-coloured on the upper surface of the toes. Upper parts olive-brown; region of the eyes, curvature of wing, and tibiae, buff-ochre. Under parts pale ochreous, with a tinge of primrose-yellow. Wings and tail light hair-brown; the feathers of the former margined with yellowish brown-olive on the coverts, and reddish on the quills; those of the latter indistinctly barred with a darker shade. "Your *Drymoica*" adds Mr. Blyth, "is nearly akin to the common *D. fusca* of Bengal, Nipal, &c., represented by *D. inornata* in S. India, but has a conspicuously longer tail, more decidedly rufescent lower-parts and around the eye, and the crown is distinctly striated, in which last it approximates the *Cisticolæ*."

29. *Cisticola tintinnabulans*, nobis. [*Ibis*, Vol. II, 51.]

This bird is of rare occurrence in Amoy, but is frequent in Shanghai and West Formosa. I have described it as *Calamanthella tintinnabulans*, in the II. Vol of the 'Journal of the N. China Branch of the Royal Asiatic Society.' On comparing ours with *C. bruniceps* of the Fauna Japonica I note the following differences. Ours is $\frac{1}{2}$ inch longer, and 5 lines shorter in the wing. The 1st quill is very short instead of being nearly equal to the 2nd, which is $1\frac{1}{2}$ lines shorter than the 3rd, 4th and 5th equal and longest. The bill is longer. The feathers of the head are bordered with yellowish-brown. No greyish-brown occurs on the breast, but the medial line from the throat to the vent is pure white, both sides of it being more or less washed with sienna-buff.

30. *Acrocephalus magnirostris*. [*Ibis*, Vol. II, 51.]

This bird abounds from Amoy to Shanghai in all reedy places and is described in the Fauna Japonica under the term *Salicaria turdina orientalis*, and stated there to be found also in Borneo, Macassar, and Sumatra.

Length $7\frac{2}{10}$; wing $3\frac{2}{10}$. Tail graduated and 3. Bill $\frac{8}{10}$, to gape $1\frac{1}{10}$. Upper parts a sienna or yellowish brown; wings brown,

margined with the same; tail do., and tipped with yellowish grey, eye-streak and throat yellowish-white. Under parts sienna-yellow with more or less white, and occasionally with a few pale brown streaks on the throat.

Mr. Blyth says, of our *Acrocephalus*, it may be remarked—"that (like the two figured in Gould's Birds of Australia) it helps to fill up the gap between the large and small species of Europe and India respectively; and that it is remarkable for the great disproportionate size of the bill, which equals that of the European *A. arundinaceus*, (L.), or of the Indian *A. brunnescens*, (Jerdon,) both of which are much larger birds."

Its song is hurried, though sweet and sometimes powerful.

31. *Acrocephalus (?) bistrigiceps*, n. sp. [*Ibis*, Vol. II, 51.]*

This small species is easily distinguished by a line of black over a yellowish streak above each eye. Length $5\frac{2}{5}$; wing $2\frac{3}{10}$; tail $2\frac{1}{10}$ and graduated. Bill $\frac{1}{2}$, to gape $\frac{6}{10}$. Upper parts olive-brown, tinged with sienna, and redder on the rump and edgings of the tail. Wings hair-brown margined with the prevailing colour. Throat, belly, and under wing-coverts whitish, the rest of the lower parts deeply washed with sienna-buff.

32. *Arundinax (?) canturians*, n. sp. [*Ibis*, Vol. II, 52.]

A winter visitant at Amoy, but found in summer at Shanghai, uttering its notes from its concealment, which are so rich and full that when first heard you expect them to be the commencement of a fine song; but alas! these 3 or 4 notes are all that the bird possesses, and though you strain your ear, listening, from the same bush you hear at intervals only the same few rich notes.

Length $6\frac{1}{2}$; wing $2\frac{8}{10}$, tail $2\frac{9}{10}$. Bill $\frac{1}{2}$, to gape $\frac{8}{10}$. Forehead and crown rufous-brown; upper-parts and tail olive-brown. Wings hair-brown with yellowish-brown margins. Throat, under wing-coverts, and belly white; eye-streak and under-parts ochreous and yellowish grey. Bill and feet brownish.

Mr. Blyth observes: "This seems very like a second species of

* This does not range well in *Acrocephalus*, nor is it a *Calamodyta*, but in form of tail approximates *Locustella*. It is, however, a distinct form, and will have to be so recognized.—*Cur. As. Soc.*

my genus *Arundinax*. The tail, however, is obscurely striated across, which I do not observe in my *A. olivaceus*; and your bird has also a much stronger hind-toe and claw, quite disproportionately so as regards the anterior toes. The white of its wings underneath is remarkable. The tail is less graduated than in *A. olivaceus*.

I have compared this with the descriptions of *Salicaria cantans* and *cantillans* in the Fauna Japonica, and though, closely allied to the former it certainly is not the same. The *cantans* seems to bear to the *cantillans* the same analogy that this species bears to the succeeding."

33. *Arundinax* (?) *minutus*, n. sp. [*Ibis*, Vol. II, 52.]

This is a most singular miniature of the foregoing, resembling it almost exactly in colour, but differing considerably in size. Length 5; wing $2\frac{2}{10}$; $2\frac{1}{10}$. This bird is also more robust in build, livelier and more open in habits, and is rarer here than the foregoing. Were it not for both birds occurring at the same season, one would be inclined to look upon this as merely a degenerate variety of the other.

34. *Phylloscopus fuscatus*, Blyth.

Common during winter, and stays so late in spring that I have a strong suspicion that it nidificates in the neighbourhood. It entertains us during the early vernal months with its pretty shake song, but its most frequent note is "*chick chick*."

35. *Phylloscopus tenellipes*, n. sp. [*Ibis*, Vol. II, 53.]

This species has delicate light pink-coloured feet, hence the name. Length $4\frac{9}{10}$, wing $2\frac{1}{2}$, 1st quill $\frac{1}{2}$ in.; 2nd $1\frac{5}{8}$, 3rd 2 in. the 4th slightly longer and the longest in the wing. The 4th, 5th, and 6th quills sinuated on the outer web; the rest inwards with mucronate tips. Tail 2, the feathers nearly equal, moderately broad, rounded on the outer web towards the tip, and sinuated on the inner, both leading to a point. Expanse $7\frac{6}{10}$. Bill $\frac{9}{20}$, to gape $\frac{6}{10}$. Tarsus $\frac{1}{2}\frac{5}{8}$; middle toe $\frac{6}{10}$; outer longer than the inner; hind toe $\frac{1}{2}$. Beak brownish, pale flesh-coloured on the tip and tomia of upper mandible and basal half of lower. Inside of mouth flesh-coloured. Upper-parts olive-green, brown on the head and upper back. Eye-streak and

cheeks cream-colour. Through the eye and below the eye-streak runs a dark line of olive-brown, darker on the coverts; the eye-streak whitening and increasing towards the occiput. Wings light hair-brown, margined and tinged with olive-sienna; quills darker hair-brown with dark shafts. Some of the large coverts tipped with yellowish. Tail light hair-brown, margined and tinged with olive-sienna, browner on the rump. Lower parts pure white, except sides of the neck, flanks, and thighs, which are slightly fibrous and grey. The shoulder, under wing- and tail-coverts, are tinged with primrose-yellow.

This is a straggling visitant during the cold weather, and may be distinguished by its note "charr."

36. *Phylloscopus sylvicultrix*, n. sp. [*Ibis*, Vol. II, 53.]

Mr. Blyth remarks on this—"a new species, differing from all but the European *sibilatrix* in the minute size of its first primary, in which character however *sibilatrix* exceeds it."

Length $4\frac{1}{2}$, wing $2\frac{1}{2}$, 1st quill $\frac{5}{10}$, 2nd $1\frac{5}{10}$, 3rd and 4th $1\frac{9}{10}$. Tail $1\frac{7}{10}$. Bill $\frac{1}{2}$; to gape $\frac{1}{2}\frac{3}{10}$. Upper mandible brown with a yellow edge, lower yellow with a patch of brown on the terminal half. Tarsus $\frac{1}{2}\frac{5}{10}$ pale yellowish-brown, yellower on the under surface of the toes and browner on the claws. Upper parts olive-green, brownish in some lights, especially on the crown. Line over the eye, a row of feathers on the lower half of eye-circle, and part of the cheeks, pale chrome-yellow; loreal space blackish-olive. Feathers of the wings and tail hair-brown, broadly margined with olive-green, a spot of yellowish-white marks, the tip of the outer web of the first 5 2nd coverts. Under-parts pale yellowish or primrose white, varying in tint. The under-shaft of all the tail feathers white, and the margin of the inner web of the 3 outer tail-feathers faint white. The size of the bill differs considerably in different individuals.

It is very numerous here during the months of April and May, and again in October and September, on its migrations.

37. *Phylloscopus coronatus*, (Temm. and Schleg.)

This species is noticeable from having a faint line of yellow on the crown like a *Regulus*, and is identical with that of the

Fauna Japonica. It wanders to Amoy occasionally during its vernal and autumnal migrations.

38. *Reguloides proregulus*, (Pallas,)—*modestus*, Gould,—*inornatus*, Blyth.

Winters here and is solitary in habits, uttering as it pursues its food a long plaintive "sweet," which, in spring, repeated several times in rapid succession, constitutes its song.

39. *Reguloides chloronotus*, (Hodgson.)

Often seen in pairs during winter, roaming about from tree to tree.

40. *Copsychus saularis*, (L.)

A common resident; native name *Chuy Kam-Chay*.

41. *Pratineola indica*, Blyth.

Winters here.

42. *Rutieilla aurorca*, (Pallas.) [*R. leucoptera*, Blyth.]

Winters here.

43. *Larrivora eyana*, Hodgson?

Straggles here occasionally, in its migrations.

44. *Ianthia rufilatus*, (Hodgson); *eyanura*, Temm. and Schleg., Fauna Japon. Winters here.

45. *Muscicapa mugimaki*, Temm. and Schleg., Fauna Japon. (see Appendix.)

[Genus. ERYTHROSTERNA, Bonap. In winter dress, I cannot distinguish it from the common *E. leueura* of India. *E. B.*]

This is a species of lively Chat-like habits, but fond of jerking up the tail like a robin. It straggles here during its autumnal migrations. The female or immature plumage, which has occurred here most frequently, may be thus described:—

Length $4\frac{8}{10}$. Wing $2\frac{7}{10}$; expanse $7\frac{1}{2}$; 1st quill $\frac{8}{10}$, 2nd $1\frac{9}{10}$, 3rd and 4th $2\frac{1}{10}$. Tail $2\frac{2}{10}$, feathers rounded on the outer web, sinuate on the inner, and ending in a point. Bill $\frac{4}{10}$, to gape $\frac{5}{10}$. Tarsus $\frac{6}{10}$, middle toe $\frac{1}{2}\frac{3}{10}$, inner toe slightly shorter than the outer, hind toe $\frac{5}{10}$; tarse thick; claws, especially the middle and hind one rather long and pointed all black. Inside of mouth ochreous. Irides black. Upper parts brown with an ochreous wash. Wings hair-brown edged paler; 2nd coverts tipped with ochreous, forming a transverse wing-

bar; 3res and a few of the interior and 2nes tipped and edged with whitish. Uropygials and tail black-tipped and edged paler, the lateral rectrices with more than half the basal inner web and shaft, the 2nd and 3rd both webs, and the 4th a part of the outer web, white, all having some black near their bases. Throat, belly, and under tail-coverts pure white. Sides of neck and throat, breast, flanks, and under wing-coverts brownish with more or less ochre. Thighs brownish. Edge of inner webs of quills pale brownish.

46. *Parus minor*, Temm. and Schleg. (Figured in Gould's 'Birds of Asia.')

The same species as that described in the Fauna Japonica. It prevails along the coast of China from Hongkong to Shanghai. The *trivirgatus* of the same work is common at Shanghai, but is not met with so far South as this.

47. *Zosterops japonicus*, Temm. and Schleg.

This answers in every respect to the bird of the Fauna Japonica, except that the 1st quill, though very *minute*, is yet not *wanting*. The bill and legs are of a slaty blue when the bird is alive, and not of a *blackish brown horn-colour* (a fault evidently attributable to the descriptions being taken from a dried skin). The breast and flanks are of a pale dingy colour, with but very little reddish. Iris dark blackish-brown. It is resident in the neighbourhood, and often wanders to Amoy during winter in search for food.

48. *Motacilla boarula*, (L.)

Common winter visitant.

49. *Motacilla luzoniensis*, Scopoli.

Common in winter; a few breed here.

50. *Motacilla lugubris*, Temminck.

Common in winter.

51. *Budytes flava*, (L.)

I think the European species; rare.

52. *Budytes sulphurea*.

Both these species are found in autumn, in rice-fields.

53. *Anthus thermophilus*, Hodgson.

Common during winter. Two other species occur, but they still remain unidentified.

54. *Pipastes agilis*, (Sykes.)
Common during winter.
55. *Corydalla Richardi*, (Vieillot.)
A common winter visitant; deeply ochreous on its arrival, but this appearance wears off as the season advances.
56. *Myiophonus cæruleus*, (Scopoli). [*Nec*. M. TEMMINCKII, Vigors.]
Lives among rocky caverns; not common, and very shy; native name *Aw-chuy*.
57. *Turdus daulias*, Temminck.
Our commonest winter Thrush, answering in every respect to the description of the species in the *Fauna Japonica*, which work represents a figure of the bird on Plate 26; but the first notice of it is due to M. Temminck, who published a representation of it in the *Planches color.* Pl. 515.
58. *Turdus pallens*, Pallas,—*pallidus*, Gmelin.
This species varies *greatly* in size, and is remarkable for its white eye-streak. It strikes me that this is the *rufulus* of Drapiez and *modestus* of Eyton, rather than the following.
59. *Turdus chrysolais*, Temminck. *Planches coloriées* from Japan.
It arrives here in small parties in early spring, and at that time is of frequent occurrence among bushes and gardens. Besides the above three, I have procured two other species still unidentified.
60. *Merula cardis*, (Temminck.)
This small and handsome species, so remarkable for the changes it undergoes from the plumage of a *Turdus* to that of a true *Merula*, seems to form a natural link between the two subgenera. These changes of plumage have been well described and beautifully figured in the '*Fauna Japonica*.' It visits us chiefly during winter, but I have no doubt that some of them spend the summer near at hand, as I have met them here late in spring.
61. *Merula mandarina*, Bonaparte; *M. vulgaris* of China, *auctorun*.
A common resident everywhere up the coast.
62. *Oreocincla varia*, (Lath.,) *nec* Horsfield; *Turdus Whitei*, Eyton.
A straggling visitant. Number of *rectrices* 14.

63. *Petrocossyphus manillensis*, (Boddiert.)

Common among the rocks all the year through.

64. *Garrulax perspicillatus*, (Gm.)

Length 12 inches. Wing $4\frac{7}{10}$. Tail $5\frac{2}{10}$. Bill $\frac{9}{10}$, to gape $1\frac{3}{10}$.

Back, wings, and tail yellowish-brown. Head and neck yellowish-grey. A band reaches from one ear-covert over the forehead to the other, forming a broad mark over the eyes.

Under parts pale rufous-ochre, very deep on the vent. Beak and legs brown.

This large Butcher-thrush is common in some parts of the country, building a nest a good deal like that of the Blackbird.

It is a shy bird, but may be known a long way off by its loud cry of *teó-teó*, uttered from time to time, or followed by a liquid guzzling low chatter.

65. *Garrulax sinensis*, (L.) [*Leucodioptron canorum*, Schiffer, *apud* C. L. Bonaparte; *Turdus canorus*, *T. sinensis*, and also *Lanius infaustus*, L.; nec *L. chinensis*, Scopoli.*]

This is the *Hwa-mei* or Spectacled Thrush of the Chinese, by whom it is prized for its fine vocal powers, as well as for its pugilistic propensities. It is, strictly speaking, a hill-bird, and very abundant on the hills near Fowehow, but as I have, on more than one occasion, met with it in the bushes here, I must include it in my list.

66. *Oriolus chinensis*, L.

A rare straggler here, but very common in S. W. Formosa. The female is slightly greener than the male on the back and wings, and is considerably larger. Another species resembling this, but spotted on the breast, I have received from Mr. Holt at Fowehow, which I take to be the *Oriolus maculatus* of Vieillot. [Young of the preceding? *E. B.*]

67. *Pycnonotus sinensis*, (Gmelin); *Turdus occipitalis*, Temminck.

* The latter is *Corvus auritus*, Daud., *Turdus shanku* et *T. melanopsis*, Gmelin, *Crateropus leucogenys*, nobis, *passim*; a true *Garrulax* inhabiting the Tenasserim hills, but doubtfully Chinese. In Horsfield's Catalogue, the name *Turdus canorus*, L., is referred to the *Merula bengalensis*, Brisson, and the former specific name adopted for that most unmusical of birds, which properly stands as *Mala-coeereus bengalensis*, (Br.)—*Cur. As. Soc.*

Very common all over the coast from Hongkong to Shanghai, and everywhere in Formosa.

68. *Pycnonotus atricapillus* [*Muscicapa atricapilla*, Vieillot, nec L.; *Hæmatornis chrysorrhous*, Lafr., and *P. hæmorrhous apud* Hartlaub, *Rev. Zool. &c.* 1846, p. 1.*]

Found abundantly in some places in this neighbourhood, but peculiarly local, seldom straying far.

69. *Tchitreca principalis*, (Temminck.)

Figured in the Planches coloriées, and subsequently in the Fauna Japonica. A rare spring straggler here.

70. *Tchitreca cæruleocephala*, (Quoy et Gaim.)

71. *Hemichelidon latirostris*, (Raffles); *cinerco-alba*, Temm. and Schleg., Faun. Japon.

A common winter visitant; remarkable for its singing notes, like those of a Red-breast, or chinking of two pieces of silver.

72. *Hemichelidon fuliginosa*, Hodgson.

Straggles to Amoy in its vernal migrations.

73. *Hemichelidon rutilata*, n. sp.

This species approximates *H. latirostris* in form, but has a bill even broader at the base. It is of rare occurrence here and only during spring.

Length $4\frac{7}{10}$. Wing $2\frac{9}{10}$. Tail? Bill $\frac{4}{10}$, to gape $\frac{6}{10}$, breadth $\frac{7}{20}$. Tarsus $\frac{5}{10}$. Head and upper neck blackish-grey. Back and scapulars reddish-brown. Wings blackish, margined with burnt-sienna. Rump and tail tile-red, the feathers of the latter more or less marked with blackish. Throat and fore-neck white, yellowish on their sides. The rest of the lower parts, excepting just the abdomen which is white, reddish or burnt-sienna ochre, more or less intense.

74. *Xanthopygia narcissina*, (Temminck);—*chrysophrys*, Blyth.

A rare spring visitant.

75. *Cyanoptila cyanomelanura*, (Temminck.)

Figured in the Fauna Japonica. Of rare occurrence here.

Myiagra cærulea, Gmelin?

A blue Fly-catcher with a small bill; procured here *once*.

* The *Pycnonotus atricapillus* of my Catalogue, founded on *Ægithia atricapilla*, Vieillot, v. *Sylvia nigricapilla*, Drapiez, a Ceylon bird, is referred to a new genus, *Meropirus*, by the Prince of Canino.—*Cur. As. Soc.*

76. *Campephaga cinerea*, Blyth ?*

Of a deep bluish-grey; with green-black wings and tail, the feathers of both tipped more or less with white, the graduated tail-feathers deeply tipped. Vent white. Bill and legs black. Length 9; wing $4\frac{1}{2}$; tail $3\frac{7}{10}$. The immature plumage is lighter grey, tinged with sienna-yellow, and indistinctly barred on the under-parts. The basal part of the inner webs of several of the wing-feathers are marked with white, forming a large bar, conspicuous on the under side or when the bird is seen on wing. This species occasionally shews itself here, in autumn and in spring.

77. *Pericrocotus cinereus*, Strickland.

Length 8, wing $3\frac{8}{10}$. Tail 4, the 3 outer feathers being shorter than the rest and equally graduated, measuring $1\frac{1}{2}$, 2, and $2\frac{1}{2}$ respectively; the 6 central ones are nearly equal. Expanse $10\frac{1}{2}$. Bill $\frac{1}{2}$, to gape $\frac{8}{10}$. Bill and feet black. The description from de la Fresnaye runs thus "Cendré en dessus; lorums, ailes, et queue, noirs; front, une tache médiane alaire, pli de l'aile, bord externe des rémiges tertiaires, la presque totalité de trois rectrices latérales et tout le dessous de corps, blancs. Longueur totale 0m. 193. Habite l'isle de Luçon (Philippines"). The *female* in all mine has *greyish-brown* wings; the black of the lore extends over the beak; and *four* instead of *three* lateral rectrices have a good deal of white on them.

The male has a broad white forehead, and a black crown which gradually blends with the bluish-grey of the back. The wings are also blacker, and there is more grey on the sides of the breast. In fact the plumage of the male bears great affinity to that of the Wagtails; and this species forms a happy transition from the *grey* of the *Campephagæ* to the *crocus* tints of the *Pericrocoti*. It looks in, at Amoy, in parties during the vernal and autumnal migrations, and is noticeable for its pretty Canary-like trill call-note.

78. *Dierurus macrocerus*, Vieillot.

By no means common in this neighborhood; but remarkably so in S. W. Formosa, where several may be seen during the

* No name of my bestowing.—E. B.

season, sitting on nests in the same bamboo-tree, swaying to and fro with every puff of wind.

79. *Lanius schach*, L.

Very common; has a great habit of shrieking. This is a *much* larger race than that found in the Indian archipelago, and is no doubt worthy of specific distinction; it remains only to be ascertained to which of the two the name was first applied.

80. *Lanius lucionensis*, Strickland.

With reference to this species, Mr. Blyth observes that this "is decidedly the true *L. lucionensis*, vide Strickland, Ann. Mag. N. H. XIX (1847), p. 132. He considers there that all the various allied races are varieties only of the same. My notion is that there are 3 or 4 cognate races, which may breed together when circumstances permit of it, and so grade into one another. Certes a Malayan *superciliosus* is very unlike your *lucionensis*."

These are common here during the seasons of migration, and I have received them this autumn from Mr. Holt at Fowehow.

81. *Enncocionus bucephalus*, (Temm. and Schleg.)

I have never met but one of this species here, and that proved a female. It has a large rufous head without the usual black face-band of the family, and answers in every respect to the description of the female in the Fauna Japonica.

82. *Corvus torquatus*, Cuv. [*Vide J. A. S. XXIX, 96.*]

Our common and only crow at Amoy.

83. *Pica media*, Blyth;—*sericca*, Gould.

Very common.

84. *Acridotheres cristatellus*, (L.)*

A very common species from Hongkong to Shanghai; builds in holes of trees or walls, or makes large oval nests in trees; learns to speak with facility and soon becomes docile.

85. *Gracupica (nigricollis)*, Paykull; *temporalis*, Temminck; *tricolor*, J. E. Gray.

A common resident, associating in small parties; builds round

* The Prince of Camiño considered this to be different from true *cristatellus* of the Philippines, and adopted the name *juliginosus*, Bl., for the China species. *Cur. As. Soc.*

nests on high trees, and lays clear blue eggs with very fragile shells ; is a noisy bird ; and is also found in Siam.

86. *Temenuchus turdiformis*, (Wagler) ; *sinensis*, Gmelin ; *elegans*, Lesson.

A common summer resident ; very restless ; builds in holes of walls ; and is also found in Pegu. Its habit of poking about among brick-holes in houses, &c. during the nesting season soon causes its newly moulted white plumes to be stained of a reddish hue, and the feathers of the wings and tail to be much abraded. Before taking its departure from us it undergoes a complete moult, and then the plumage is clean enough.

87. *Temenuchus sericeus*, (Latham.)

A winter visitant ; feeds largely on banyan berries.

88. *Temenuchus cineraceus*, (Temminck.)

This resembles the foregoing a good deal in form, but is broader across the back, and generally more robust. It also visits us during winter ; and is identical with the bird found in Japan.

89. *Eophona melanura*, (Gmelin.)

Found here the winter through ; but leaves us before summer ; breeds in Shanghai.

90. *Munia malacca*, (L.) common in autumn. }
 91. *Munia molucca*, (L.) scarce. } [Distinct, *E. B.*]
 92. *Munia rubronigra*, Hodgson, very scarce.
 93. *Oryzornis oryzivora*, (L.) Occasional winter flocks.
 94. *Ligurinus sinicus*, (L.)

Fringilla kawarakiba minor, Fauna Japonica.

Half Goldfinch, half Greenfinch ; not uncommon all the year, has a pretty tinkling note ; and feeds on thistle-heads as well as grain, &c.

95. *Passer montanus*, (L.)

Common about houses, resembles in habits *P. domesticus*.

96. *Emberiza fucata*, Pallas.

Met among standing grain during winter ; difficult to procure from its habit of dropping under cover of the grain, and seldom perching on exposed places.

97. *Emberiza pusilla*, Pallas.

Occasional flocks during winter.

98. *Emberiza canescens*, n. sp. [*The Ibis*, Vol. II, 62.]

This occurs during winter, and is probably new.

Length $5\frac{2}{10}$. Wing $2\frac{9}{10}$. Tail $2\frac{1}{2}$ and somewhat forked. Bill $\frac{7}{10}$

Head and neck sienna-gray; crown, cheeks and throat, blackened, of a frosted appearance. Back and scapularies black, each feather broadly margined with white and more or less tinted with reddish-sienna. Wings blackish-brown, broadly margined with sienna-white. Under-parts and rump white, sienna-washed. Tail blackish-brown, having the two central feathers broadly margined with white, the rest on each side hardly at all; the outer feathers white except a small broad portion of the inner web, the 2nd broadly tipped with the same.

The female is deeply tinged with reddish-brown above and reddish-ochre beneath.

99. *Emberiza personata*, Temminck.

Our commonest winter Bunting.

100. *Emberiza aureola*, Pallas.

Met in flocks in autumn feeding on the ripening corn.

101. *Emberiza Lathamii*, Gmelin.

Common in winter; a few breed in the neighbourhood.

102. *Emberiza fruticeti*, Kittlitz; *sulphurata*, Fauna Japon. Rare.

103. *Alauda caelivox*, Swinhoe.

This bird, which I have described under the above name in the III vol. of Shanghai Asiatic Society's Journal, differs from the Japanese Lark, *A. japonica*, Temminck, in being much smaller. The largest specimen I have measured is one inch shorter than the Japanese, though the wing is much the same length. The inner toe is $\frac{3}{4}$ longer than the outer instead of being shorter. A close comparison of the two birds is of course required before any decision can, with safety, be arrived at, but it must not be forgotten that our's is a peculiarly Southern Chinese Lark, not being found even so far north as Shanghai.

104. *Yunx torquilla*, L.

Common during winter. The $\frac{1}{4}$ inch red tree-ant appears to be its most favourite food, but it does not despise the large black bush-ant.

105. *Cuculus canorus* ? L.

Taken here on its autumnal and vernal migrations, but breeds at Fowchow and Shanghai.

106. *Cuculus tenuirostris*, Gray.

A summer visitant ; has a loud-toned whistle repeated 4 times and terminating with a shake.

107. *Turtur chinensis*, (Scopoli.)

Common everywhere from Hongkong to Shanghai.

108. *Turtur humilis*, (Temminck.)

A summer visitant ; extends as far North as Shanghai, and is there of a larger size, though evidently of the same species.

109. *Turtur orientalis*, (Latham) ; *gelastis*, Temminck.

This large species, found in Lapland and Japan, countries so far situated apart, has been shot here by myself during winter, but it makes short stay with us. I have seen the bird in Formosa, and one was caught by a ship off the Madjicosima group.

110. *Francolinus perlatus*, (Gmelin.)

Birds of this species are brought to market by the natives from some neighbouring part of the country.

111. *Coturnix chinensis*, (Gm.)

Met in winter among standing corn ; and evidently as distinct from the European species, as from the Japanese. [Evidently a misnomer. E. B.]

112. *Squatarola helvetica*, (L.)

Winter visitant ; met with in small flocks on the river mud-flats.

113. *Charadrius virginicus*, Bechst. [*Pluvialis longipes*, Bonap.]

This species, I think, rather than *pluvialis*. Winter. Tail not distinctly banded, breaking off in the middle ; size smaller than the European. Axillæ *mottled-gray* and not *white*.

114. *Charadrius cantianus*, Latham.

Arrives with the water-fowl, and frequents our sea mud-flats, often in large flocks.

115. *Charadrius philippinus*, Latham.

Found on inland marshes, and new-turned fields during winter.

116. *Charadrius Leschenaultii*, Lesson.

I have only one specimen, which was shot out of a flock of *C. cantianus*. It is very much larger than the so-called

Kentish Plover, but resembles it in winter garb, except that this has no *ventral* white, indications of a perfect breast-band, and lighter brown *remiges* and *rectrices*.

117. *Hæmatopus ostralegus*, L.

Rare winter-visitant.

118. *Ardea cinerea*, (L.)

Often seen here ; but builds large *heronries* at Fowchow.

119. *Herodias egretta*, (L.) ? *H. modesta*, (Gray).

A large white Heron, seen occasionally ; not identified.

120. *Herodias garzetta*, (L.)

The common resident species ; building in company on large banyan trees.

121. *Herodias eulophota*, n. sp.

This differs from *H. gazetta* strikingly in having a *yellow* bill, full-crested occiput, *round* instead of *square* tail and shorter legs. It is moreover rare and solitary in habits while with us during summer. It bears considerable affinity to *H. candidissima*, Wagler, of N. American Ornithology. Bill fine yellow, becoming flesh-coloured and purplish on the lores and round the eye. Irides pearl white. Long loose feathers spring from the occiput forming a full crest, the highest ones being longest and measuring $4\frac{1}{2}$ each, the length diminishing gradually in the lower ones. Long loose feathers also spring from the lower neck, and from the back where they become decomposed into hair like silky webs curling upwards at their ends. The whole plumage is of a snowy white. Legs and toes yellowish or red-green, yellower on the soles and joints ; the upper surface of the lower portion of the tarsus is blackened, as also are some of the toe-joints but irregularly ; claws blackish-brown.

Average length 25 inches ; wing $9\frac{8}{10}$; tail $3\frac{1}{2}$. Bill $2\frac{9}{10}$, edge of lower mandible $3\frac{6}{10}$. Naked part of tibia $1\frac{6}{10}$; tarsus $3\frac{3}{10}$; mid-toe $2\frac{1}{2}$, outer-toe $2\frac{2}{10}$; inner $2\frac{1}{10}$; hind-toe $1\frac{1}{2}$.

122. *Buphus coromandus*, (Boddäert) ; *russata*, Temminck ; *caboga*, Pen.

A numerous summer resident.

123. *Ardeola prasinoscelis*, n. sp. [*The Ibis*, II, 64.]

I have long had suspicions as to the identity of our bird with either

the *speciosa* from Java or the *leucoptera* from Bengal, and now, having satisfied myself, I will endeavour to shew the difference. In the first place on comparing our *Ardcola* with the description of *A. speciosa* in "Horsfield's Researches in Java," the distinction is at once apparent. We begin with ours. Description of male shot 30th May. Bill black for nearly one half from the apex, middle portion chrome yellow, base and cere indigo-grey. Legs *greenish-chrome*. Irides orange-yellow. Head and neck Indian-red, changing into purple as it descends to the back. Throat, median line of under neck, belly, rump and wings white. Back having long loose *bluish-grey* feathers decomposed and hair-like. Long and hair-like feathers also spring from the lower neck, nearly covering the blue feathers of the breast. Crest composed of two long subulated feathers $4\frac{1}{4}$ long, with several shorter ones fitting into the grooves on their under sides; these feathers are the *same colour as the head*. Now Horsfield states that the *A. speciosa* has "in its complete dress the head above, &c. isabella-yellow with a rufous tint * * * * colour of the back *intensely black* * * * * feet *dark yellowish-brown* * * * the crest consists of from 4 to 6 greatly lengthened linear plumes of a *very pure milk white* colour. The bill is dusky at the base."

This comparison of the adult plumage is surely convincing of non-identity of the two birds. The immature and winter plumage would appear to be more similar, but even here there are differences. In the Malayan species apud Horsfield "the wings and the tail are pure white," in ours they are more or less darkened with blackish. In his "the feet and the upper mandible throughout its whole length, are black." In ours the former are bright yellowish-green with brownish claws, and the bill pale liver-brown, black on the apical quarter of its length; the naked or loreal space greenish-yellow, bluish at the base of the bill.

It will thus be seen that our species is perfectly distinct from the Malayan, *A. speciosa*, and for its non-identity with the Bengal species I give the testimony of Mr. Blyth who re-

marks on some skins sent by myself to him, "It is so exceedingly like our common *A. leucoptera* in winter dress as to be hardly, if at all, distinguishable; but utterly unlike it in summer garb."*

Our bird resides here all the year through, feeding in paddy-fields and marshy ground. Its food is not confined to fish, but grasshoppers, and insects of most kinds are acceptable. In confinement it soon becomes omnivorous. It is more or less solitary in habits, building loose nests of sticks on the topmost boughs of banyan trees. The fledged young keep together for some time after they leave the nest. [I consider this bird to be true *speciosa*. E. B.]

124. *Ardetta flavicollis*, (Latham.)

Rare here; but common during summer at Fowchow.

125. *Ardetta cinnamomea*, (Gmelin.)

A summer visitant.

126. *Ardetta sinensis*, (Gmelin); *lepida*, Horsfield.

Common during summer among the bushes that line the banks of the river.

127. *Butorides javanica*, (Horsfield.) Summer visitant.

128. *Nyctiardea grisea*, Vigors.

Rare here, but common at Fowchow.

129. *Platalea leucorodia*, L. Rare winter visitant.

130. *Numenius major*, Fauna Japon., Temm.

Regular winter visitant; frequents mud flats.

131. *Totanus glareola*, (L.)

Common on inland marshy ground during winter.

132. *Totanus ochropus*, (L.)

Met by small streams of fresh water during winter, very seldom near pools of salt water.

133. *Totanus chloropygius*, Vieillot?

Resembles the former in appearance and in habits, but is rarer.

134. *Totanus glottoides*, Vigors. [Identical with *T. glottis*. E. B.]

Common during winter on mud flats at the river's mouth.

Totanus pulverulentus, Müller and Schleg.

In the collection of G. Schlegel, Esq., and shot at Amoy.

* The same remark applies to the European and African *A. comata* v. *ralloides*. E. B.

135. *Tringoides hypoleucos*, (L.)

Our common species, found the greater part of the year on the sea-shore.

136. *Recurvirostra avocetta*, L. Occasional winter visitant.

Chinensis, Gray.

137. *Tringa cinclus*, L.

Upper tail-coverts *black*, and not *white* as in *T. subarquata*; bill long and curved.

Frequents our shores in *large flocks* during winter.

138. *Tringa minuta*, Leisler.

Autumnal flocks drop here.

139. *Tringa Temminckii*, Leisler.

Found in small parties scattered over wet fallow paddy-fields in the cold season.

140. *Scolopax rusticola*, L.

Drop here during their migrations or on their first arrival.

141. *Gallinago uniclava*, Hodgson.

Our commonest species in paddy-fields; retires in summer to breed.

142. *Gallinago stenura*, (Temminck.)

Also common, but more solitary than the above.

143. *Gallinago solitaria* (?), Hodgson.

Found in ravines among the hills; very solitary. It is a large species and has the tail slightly rounded and consisting of 20 nearly equally long feathers; the 8 middle ones broad and the 6 lateral ones narrow, beginning with the 1st which is little more than $\frac{1}{16}$ wide and gradually increasing towards the outermost of the 8 central, which is narrower than the rest.

It differs a good deal from the species described as *solitaria* in the Fauna Japonica.

144. *Gallinago major*, (L.)

This species I have met only during the month of September in fields overflowed with salt water. It is rather solitary and rises with a cry. It resembles *G. major* more nearly than any I am acquainted with, but has *eighteen* tail-feathers instead of *sixteen*, and the outer toe is disproportionally long.

145. *Gallinula orientalis*. Rare.

146. *Gallinula phænicura*, Pennant ; *javanica*, Horsfield ; *chinensis*, Boddaërt.
Rare.
147. *Anser segetum*, Latham ?
Frequents the mouth of the river in immense flocks during winter.
148. *Tadorna vulpanser*, Fleming.
149. *Casarca rutila*, (Pallas.)
150. *Anas boschas*, L.
151. *Anas pæcilorhynca*, Gm.
152. *Dafila acuta*, (L.)
153. *Querquedula crecca*, Stephens.
All more or less common during winter in the river.
154. *Querquedula falcata*, (Pallas) ; *multicolor*, (Scop.) ; *manillensis*, Gmel. ?
155. *Fuligula marila*, (L.)
156. *Fuligula cristata*, Stephens.
157. *Mergus serrator*, L.
158. *Colymbus glacialis*, L.
159. *Podiceps cristatus*, L.
160. *Podiceps auritus*, L.
More or less common during winter.
161. *Podiceps philippensis*, Bonn.
A resident species in large rush-covered ponds ; *chinensis*, Temminck.
162. *Diomedea brachyura*, Temminck ?
163. *Diomedea fuliginosa*, L. ?
Caught by fishermen outside the harbour and brought to market.
164. *Larus canus*, L.
165. *Larus fuscus*, L. ; *flavipes*, Meyer.
166. *Larus melanurus*, Temm. and Schleg.
167. *Larus* ——— ?
168. *Gavia Kittlitzii*, (Bruch) ; *maculipennis*, Bonap.
169. *Sterna caspia*, Pallas.
170. *Sterna cristata*, Stephens ; *pelicanoides*, King ; *velox*, Rüppell.
More or less common during winter.
171. *Sterna minuta*, L.
172. *Hydrochelidon javanica*, Horsfield.
Rare summer visitant.

173. *Pelecanus crispus*, Bruch ; *philippensis*, Gmelin.

Common in winter.

174. *Graculus carbo*, L.

APPENDIX OR ADDENDA.

(Remove No. 45 to the *Muscicapidæ* and before the description of the female add)

The bird that formed the subject of description in the Fauna Japonica was most probably in full summer plumage. The account in that work runs thus :—" Les parties inférieures de cet oiseau, à partir du menton, sont d'un brun ferrugineux jaunâtre et très-vif, mais passant au blanc sur le bas ventre. Cette dernière teinte occupe également les couvertures inférieures de la queue, et les supérieures des grandes couvertures extérieures de l'aile. La moitié postérieure de la barbe externe des cinq paires extérieures des pennes de la queue est également teinte de blanc, les supérieures des rémiges secondaires sont bordées de blanc, et on observe une raie blanchâtre mais très peu apparente au dessus de la région des oreilles. Toutes les autres parties de l'oiseau sont d'un noir, plus pâle et tirant au brunâtre sur les ailes. Les plumes axillaires sont d'un brun ferrugineux jaunâtre, et les petites couvertures inférieures des ailes, noires mais bordées de blanc."

The only male as yet shot here was procured by G. Schlegel, Esq. on the 15th November, but instead of a black crown, back and scapularies, it has those parts olive-brown with a reddish wash. The *white* on the upper coverts is more indistinct; and the basal portion of inner webs of the 5 lateral rectrices are more or less white. In all essential points it is so similar, that I have little doubt of its being the Japanese species in male winter plumage.

(Add, as a species, after No. 36, *P. sylvicultrix*.)

Phylloscopus hylebata, n. sp.

From one individual in the collection of G. Schlegel, Esq. of Amoy. I have compared this specimen with upwards of 20 or 30 specimens of *P. sylvicultrix*, and come to the conclusion that it must be distinct. Though the size of this species is greater, yet the 1st quill is more minute than in the foregoing.

Length 5, wing $2\frac{6}{10}$ tail 2. Bill $\frac{9}{20}$, deep blackish brown with pale tomia. Tarsus $\frac{8}{10}$. Legs and claws deep blackish-brown with yellow soles and tips to claws. The olive-green above is much the same as in *sylvicultrix*, but the eye-streak and under-parts are much yellower.

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*On the Translation of Waves of Water with relation to the great flood of the Indus in 1858.—By J. OBBARD, Esq.*

“At 5 A. M. on the 10th August, 1858, the Indus at Attock was very low. At 7 A. M. it had risen ten feet. By 0.30 P. M. it had risen fifty feet, and it continued to rise until it stood ninety feet higher than it did in the morning. The Cabul river continued to flow upwards for ten hours. The fall was at first slow; but the river was about eight feet below its maximum by sunset; and continuing gradually to fall, it had during the 12th returned very much to the position it occupied before the flood came down.”—*Extracts from Journal of Asiatic Society*, 1858, 1859.

1. Several papers have been recently forwarded to the Society upon the great flood of the Indus in August, 1858, and, as it is a subject in which I take great interest, I trust that I may be excused in submitting my views regarding it.

2. I propose, therefore, in the following paper, to consider the mode in which this vast body of water passed Attock, and with this view, I shall first treat cursorily of the nature of waves of water generally, more especially, however, dwelling upon waves of the class which from their formation and size, seem to be analogous to that which is under consideration, stating in general terms, their mode and rate of transit; and the limit within which wave translation is possible; and I shall then endeavour to shew the application of these laws to the specialities of the Indus wave, touching briefly upon some erroneous speculations which seem to have been made upon insufficient data.

3. A wave is an inequality of surface or variation of level in a stream of water, which may be of any size according to the force of its original cause. It is unnecessary to enquire into the origin of a wave for the purpose of elucidating its specialities, as all waves when



once formed and the original cause withdrawn, or as they may be termed *free*, obey the same laws, and are subject to the same peculiarities.

4. The undulation upon a smooth sheet of water from a school boy's pebble; the ocean wave thrown up by the wind; the gush of water from a destroyed dam or suddenly-withdrawn barrier; the swell from a steamer's paddle; and the great free tide-wave which, twice in the twenty-four hours is poured into all estuaries and rivers through the inequality of the attraction of the heavenly bodies:—all these waves so different in origin, size, and formation, are subject to the same series of laws, which have been, to a certain extent, investigated.

5. It should first be remarked that the progress of a wave is not the progress of the particles of which it is composed. A traveller, upon visiting the sea-shore for the first time, might be led to suppose that each wave was bringing with it the mass of water of which it was originally composed, and depositing it upon the shore. A little closer observation would, however, soon convince him of his mistake, as he would perceive that a piece of drift wood or of foam, would maintain the same mean distance from the beach, although several successive waves lifted it upon their crests, and deposited it in their succeeding hollows.

6. The same law may be shewn to hold with the tidal wave. In the accompanying tide table (with a copy of which, if thought useful, I shall be happy to furnish the Society annually)—the time of high water at Calcutta, or of the passage of the crest of the tidal wave at that place, is predicted for every day throughout the year. In the lower part of the sheet, the distances of places from Calcutta along the river are given in geographical miles, and against each, under the column of “correction for high water,” is the interval of time which the crest of the wave occupies in travelling that distance. With these data it will be seen that the tidal wave of the Hooghly has a mean speed between Saugor and Calcutta of about  $20\frac{1}{2}$  geographical or 24 British miles per hour—while the speed of the water perhaps never exceeds eight, and is frequently as low as 2 miles per hour—without any corresponding variation in the rate of translation of the wave. The position, moreover, of the junction of the salt water of the ocean, with the fresh water of the river stream, is

not permanently affected by the passage of the wave, but oscillates between two fixed points upon flood and ebb, according to wave laws which will presently be indicated.

7. The progress of a wave then may be described as the translation of a shape or form, in which the particles are continuously changing—but these particles although they are successively cast off, have a certain motion communicated to them by the wave, though it is not that of the wave itself.

8. The sea side observer would with attentive watching perceive, that the piece of drift wood or foam is actually carried forward by the crest of the wave to a certain extent, though not in anything like the ratio of progression of the wave itself, and that when the wave has passed, it is carried backward in the succeeding hollow, so that it always occupies the same mean position; and in like manner, a boat or a ship, and the termination of the salt water, are carried a certain distance up a river by the flood or crest of a tidal wave, and down again by the ebb or hollow, so that if uninfluenced by other causes they will recover their original position.

9. It has been mathematically demonstrated, and direct experiment has established, that the particles of water of which a wave is composed, actually move in a circle; or an ellipse; the formation of which varies in proportion to the mass of the wave, and the depth of the water.

10. When the wave is small, and the water deep, the particles move nearly, if not quite, in a perfect circle,—in other words the vertical and horizontal displacements are about equal; but when the wave is very large, as the tidal wave, and the water shallow, the vertical displacement is wholly insignificant to the horizontal, and the motion of the particle, measured from any fixed point, is an extremely flat ellipse, of which the horizontal is the major axis.

11. In the accompanying sketch, a wave is supposed to be travelling along a level sheet of water from X. to Z.—A. is the centre of the preceding hollow:—B. the middle of the anterior slope:—C. the crest of the wave:—D. the middle of the posterior slope:—and E. the centre of the succeeding hollow. A particle of water which is at A. will be carried backward or towards the wave:—At B. its horizontal motion will be neutralized and it will be found



Sketch of the Motion of Wave Particles.



to move directly upwards. At C. it will be carried forwards with the wave:—At D. it will have no horizontal motion, but will be carried downwards to the same extent it was moved upwards at B. and at E., it will be again carried backwards:—at which point the whole wave having passed, it will hold the same actual position which it did at A., the vertical and horizontal displacements having exactly balanced each other. It is scarcely needful to remark that there is no sudden alteration from the horizontal to the vertical motions, and vice versâ, but that at each intermediate position the motion is a compound one, forming a gradual curve:—these fixed points having been only selected for convenient illustration. All the particles below the surface pursue the same course as those above them; i. e.—all those below the crest of the wave move forwards; and all those below the hollow move backwards, but where the water is deep the motion low down becomes imperceptible, and where it is shallow it is practically the same as at the surface.

12. The motion of a wave therefore, being simply the translation of a shape, is unaffected by any current which may be running in the stream on which it is generated. According to the direction of its original impetus it may travel with a current, at right angles to it, or even directly against it; and either up hill or down hill; without its speed or rate of transit being materially affected thereby. I say materially, for a current does, to a certain extent, modify the conditions of a wave, and I have reason therefore to think that it may also affect its speed, but that this effect, if there be any, is very slight, may be easily demonstrated.

The Hooghly, like all other rivers, must be considered as a stream of fresh water running towards the sea, into which is poured, once every twelve hours, a large wave. As the crest of this wave is approaching or passing a given spot within the river, the particles of which it is temporarily composed are flowing upwards, or it is technically termed flood tide. It is evident that the upward speed of the particles is checked by the constant resistance of the river stream, and that in like manner when the crest of the wave has passed, and the particles receding in the hollow, they are aided in their backward course, by the velocity of the river stream.

13. The river stream is therefore a constant—plus to the ebb, and minus to the flood.

14. But the speed or force of the river stream varies considerably at different times of the year. In the month of March, or the dry season, its rate off Calcutta does not exceed half a mile per hour; whereas in the month of August, or the height of the freshets it may amount to three miles per hour. Now, if the river stream does sensibly retard the passage of the wave itself, it is evident that its effect is far more potent when it is large, and we have thus a direct experiment of variation afforded us to discover if this be the case.

15. When the time of the lunar transit is 0h. 0m. or when the sun and moon are in conjunction; the crest of the tidal wave passes the floating light vessel, which is 119 miles below Calcutta, at 9h. 0m. throughout the year. This is not critically correct but sufficiently so for the purpose. In the month of March the same wave reaches Calcutta, at 2h. 35m.; and in the month of August at 2h. 10m. by which it would appear that it actually takes less time by twenty-five minutes to travel to Calcutta during the height of the freshets, than it does in the dry season, and this, although the upward current of the particles of which the wave is composed, is entirely neutralised by the increased rush of the river stream.

16. The fact is, that the speed of the wave depends almost entirely upon two other contingencies, viz. the depth of the water, and the mass of the generated wave.

17. When the depth of the water is greater than the length of the wave, the rate of translation depends entirely upon the mass of the wave, and is proportional to the square root of its length.

18. When the depth of the water is small and the wave very great, as in the tidal wave in rivers and those analogous to it, the velocity of translation depends solely upon depth of the stream, and is proportional to the square root of the depth.

19. From what has been above stated, the cause of the superior velocity of the tidal wave up the Hooghly in August is apparent; and that, if the river stream exerts any sensible retarding effect whatever, the increased natural velocity of the wave, through the river being surcharged with water, is sufficient to neutralise it altogether.

20. The rapidity therefore of a river stream or current is no criterion whatever of the rate of translation of a wave upon it; and such a supposition may lead to very erroneous conclusions, as the speed of





Portion of river with a barrier



a current is markedly increased by compression, which on the contrary, retards the translation of a wave through friction.

21. It is now necessary to trace the connection between the phenomenon of the flooding of the Indus, and the preceding laws; in fact, to answer the question which has been proposed on the assumption of the cause being some obstruction above. Why may not all the water which was heaped up above the dam be supposed to have come down the river as a huge cataract when the barrier was overcome: without taking the formation of a wave at all?

22. To this it may, I believe, be answered. 1st. That it is impossible according to the laws of fluids, that a variation of level, however it may have been caused, should do otherwise than alter its position by wave motion, (excepting in the case noted in a succeeding section.) The huge superincumbent mass must necessarily force up the water about and beyond it, far more rapidly than its own particles could run down the declivity for the following reasons.

Let A B C be a portion of a river flowing towards the sea on a slightly inclined plane, and let there be a barrier at B which has so completely shut off the water above it, that by the accumulation of rain, melted snow, &c. it has risen several feet above the level of the river below it. Now, let us suppose the barrier B to be suddenly destroyed, what will be the motion of the waters?

The triangle A B D is then evidently, for all purposes of calculation, a ready formed wave, which will follow the laws of a wave in the mode of its translation. A small portion of the water near to B will of course topple over upon the water below it in foam through lateral pressure, but this will only continue so long as a sufficient slope is forming, to support the wave unbroken. The great body of the water will follow a different course.

Let us take the column of water x y z; each particle under x is pressed downwards, but finds no outlet in that direction; and as fluids press equally in all directions, the forces towards A and B are equal; but from A it is also shut out, and it is consequently directed towards B with a force proportional to the differential gravitation of x z and F z, but beyond B E the particles will be pushed upwards as well as forwards, causing the water to be heaped up successively at F H J, &c. thus translating a protuberance above the level of the

stream to those spots by the simple pressure of gravitation; long before the particles *x*, *b*, &c. can reach them—(always conditionally that *D E*, *F G*, &c. are sufficiently long to float the wave, which contingency will be treated of hereafter.) In other words the particles *x*, *b*, move down the river with a speed proportional to the sine of the angle of the inclination of its bed; *minus* friction, and *plus* the wave motion communicated to them; but the wave crest is translated *directly* according to the known ratio of gravitation, *minus* only the retard of friction.

2ndly. That we have evidence that the phenomenon presented all the characteristics of a wave. We are told that in the morning the river at Attock was “unusually low.” This was the preceding hollow,—then that “the river at first came swelling up quite quietly but very rapidly, not less for a little time, than a foot per minute.” This was the rise on the anterior slope,—then “this of course did not last very long, for as the width, the depth and the velocity increased, so did the discharge, &c.” This was the onward motion of the particles at the passage of the crest.—Then we hear of a more gradual fall on the posterior slope of the wave, which seems to have been much flatter than the anterior slope, as is always the case with large waves in shallow water. These facts are apparently in accordance with the wave laws, and inconsistent with any other theory. And it may be replied,

3rdly. That those who doubt may make the matter a direct subject of experiment upon a small scale.

23. From the nature of the phenomenon of the flooding of the Indus; and for the reasons above detailed, I have no hesitation in considering it, when it passed Attock, as an immense wave, the mass of which was very considerable in proportion to the depth of the stream. I consider it therefore analogous to the tidal wave, and it is, on that account, that I have treated so fully of waves of that class. I have little hesitation in ascribing to the Indus wave a length of one hundred miles when it passed Attock, but if it were only five miles or as much as five hundred, the following results would not be materially affected.

24. Where the depth of the stream above Attock was not more than twenty-five feet—the rate of translation of the wave should

theoretically have been about nineteen British miles per hour : and where it equalled fifty feet, the speed should have equalled twenty-six miles per hour : and so on, increasing in direct proportion to the square root of the depth of the river.

25. It is, however, necessary here to observe that the foregoing remarks are only applicable within certain limits ; and that when the depth of the stream is very small, the continuity of the wave motion is lost ; and the crest of the wave topples over in broken water. The limit of depth within which, wave motion is impossible, is perhaps not very closely ascertained ; but if it be assumed at one-half the height of the advancing wave, it will be sufficiently close for the present purpose. It seems that when a wave reaches shallow water, sufficient particles do not exist in advance, to maintain the altitude of the anterior slope.—Its form consequently changes gradually from a slope to a perpendicular, until the particles on the crest still proceeding with the same velocity, find at last no support and topple over by their own momentum in a torrent of foam. The swell upon a coral reef ; the flood bore of the Hooghly ; and the heavy surge upon the Madras coast ; are illustrations of this law respecting large waves in shallow water.

26. It would not have been necessary to dwell upon this fact with relation to the Indus wave of 1858, which certainly was not a broken one ; but, as discredit has been thrown upon the traditions respecting the noise, the foam, and the destruction, &c. of the previous flood of 1841, and the diminution of water previous thereto, together with the greater altitude it attained, because similar phenomena were not present in 1858, I would observe that the very concomitancy of these traditions, leads me to yield a general belief to the whole of them. It is stated that the flood of 1841, culminated at twelve feet higher than that of 1858, and started from a much lower zero. It is, therefore, probable that the positive altitude of the wave was twenty-four feet greater than that of the late flood ; and moreover, that the stream upon which it travelled was twelve feet shallower. It is therefore very probable that the conditional limits within which wave motion is possible, were not present in 1841, though they were in 1858.

27. I regret that so little practical information can be deduced

from the preceding theory, regarding the late flood—much local knowledge would be requisite to obtain any result which would be even generally satisfactory. Moreover, the disturbing effects of friction, through varying depths and breadths, and the influence of tributaries; would perhaps always prevent a close approximation between observed facts and theoretical deductions. Still, however, as correct methods of investigation are only second in importance to accurate observations of phenomena; I trust that the foregoing exposition of what I believe to be the true principles of tidology will not be wholly valueless—which, it will not be, if it only induce those who are better able to deal with the difficulties of the subject, to examine and refute the errors into which I may have fallen.

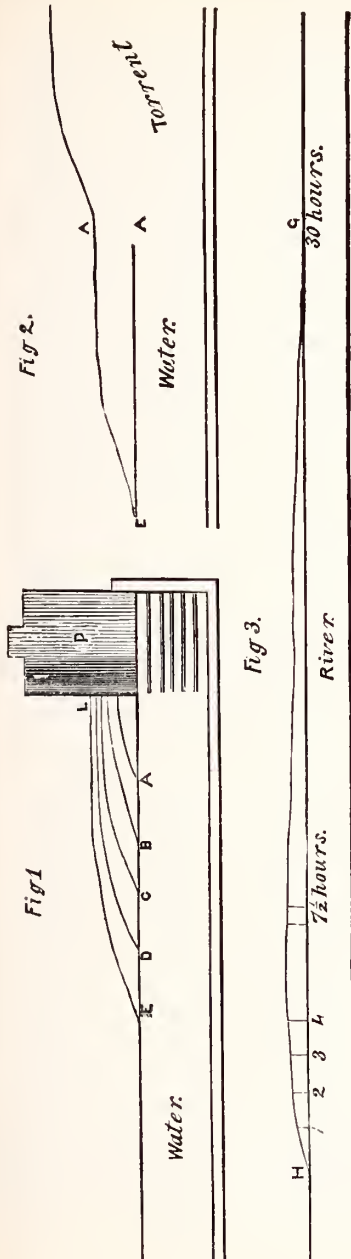
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On the physical difference between a rush of water like a torrent down a channel and the transmission of a Wave down a river—with reference to the Inundation of the Indus, as observed at Attock, in August, 1858.—By ARCHDEACON J. H. PRATT.

The following paper is the substance of some remarks I made at the monthly meeting of the Asiatic Society early in September, after the reading of Mr. Obbard's paper published above. That interesting communication was shown to me and to one or two other members when it was first forwarded to the Society, and a discussion which ensued persuaded me that some further explanation of the manner in which a wave may have been generated on the Indus, as supposed by Mr. Obbard, by the bursting of a bund and the precipitation of the pent-up waters, would not be unacceptable.

I do not stand forth precisely as the advocate of the view, that the rise and fall of the water at Attock was produced by the transmission of a wave, rather than by the ordinary rush of water in a swollen river; because there are several facts, which it is necessary to determine before coming to a decision. We ought to know whether there are any great bends and shallows in the river; and the phenomena to be explained ought to be more fully before us. My object is to show the possibility of such an explanation as Mr. Obbard has advanced; and to give my reasons for on the whole inclining to the view that the disturbance at Attock was produced by the passage of a wave.

J. H. P.



1. In fig. 1 suppose that A E is a surface of still-water, in a canal closed at one end and extending indefinitely to the left. P is a gigantic plug, supposed to be thrust down vertically into the water. As the plug descends, pressure will be continually communicated through the water so as to lift up the surface of the water in the canal. As the plug descends successively to a, b, c, d, e (omitted by the engraver), the surface will be raised up into the curves at A, B, C, D, E. The greatest rise at any instant will be close to the plug, where the pressure has been acting longest; and the elevation of the surface in each curve will be less and less in passing down the canal, because the pressure has been acting for a shorter and shorter time. At the instant the plug reaches the bottom, the surface will have been elevated into half a convex wave L E, its length depending upon the rapidity with which the pressure has been communicated. The amount of water in this elevated half-wave will be equal to the volume of water displaced by the plug. It is evident, that during the formation of this half-wave the several particles of water beneath its surface have received a slight upward and forward mo-

tion of transfer; this effect being produced by the plug forcing onwards into the canal the water it displaces.

2. If the plug remains motionless after it has reached the bottom, and the half-wave it has forced up is left to itself, the following process will take place. The higher parts of the half-wave will sink by their own weight and press up its less elevated parts; and these in their turn will by their weight press up the surface of the hitherto still water of the canal beyond the originally formed half-wave. By this process the half-wave *L E* which was generated by the plug will form itself into a whole-wave of less height and greater length than the half-wave, like *G K* in fig. 3. This whole-wave will move freely along the canal, elevating the surface of the water at each place as it passes it, and then depressing the surface again to the original level. The slope of the back of this wave will, in general, be longer than the forepart of the wave, because this slope is formed by the sinking of the elevated water merely by its weight; whereas the forepart of the wave is formed (as above described) by the forced action of the plug, and this force is supposed to be much greater than the mere difference of weight arising from the different elevations of the different parts of the wave. This free whole-wave is represented in fig. 3. The volume of water in this whole-wave, which moves solitarily and freely along the canal, is the same as the volume of water in the forced half-wave from which it grew, and therefore is equal to the volume of water displaced by the plug.

3. The length of the generated half-wave, (and therefore also the length of the free whole-wave which finally moves along the canal,) depends upon the rapidity with which pressure is communicated through water. This rapidity depends upon the exciting cause. A very extreme example of the communication of pressure through water is seen in the velocity of sound through water, which has been found by careful experiments in the Lake of Geneva to be about eight-ninths of a mile in one second, or 3200 miles an hour. At this rate is the pressure communicated, which causes the minute but rapid vibrations of the water which produce the sound. Another example is the velocity of the tidal-wave up the Hooghly, which moves (as Mr. Obbard states) at 24 miles an hour. I have myself made experiments on the great swell-waves at the Equator and found

them to move at 27 miles an hour.* Waves may be made, as is well known, to move much slower than this, if the pressure producing them is less. The rapidity of the communication of pressure, and therefore the velocity of translation of the wave, depends upon the intensity of the cause producing the pressure.

4. In order to apply these results to the phenomenon in question, I suppose, instead of the plug pressing down the surface, a large body of water to have fallen upon the surface of the Indus by the bursting of the barrier, as represented in fig. 2. According to the force with which this descending mass struck the river, would be the velocity with which the front of the generated half-wave would begin to move down the river. As the cataract poured down from the broken barrier, its successive portions, after causing the pressure by their impact and weight and so aiding in the generation of the half-wave, would become themselves in turn part of the river, and so part of the medium through which the pressure of the next falling portion was transmitted, to continue the generation of the wave.

* During a voyage from England by the Cape in 1838 I made the following experiment with the assistance of the first and second officers. A day was chosen when the swell was moving from ahead aft, and the ship was making only about three knots. At one end of the log line a large bung was fastened, and 40 fathoms further up another large bung was tied on, the intermediate forty fathoms of line having a number of smaller corks attached to it to make it float. The line thus furnished was thrown into the water astern, and more line allowed to run off the reel till the bungs were well clear of the ship. The second officer, who held the reel, then checked the line from running out further: and the 40 fathoms of line between the two bungs were drawn out straight by the way the ship made. As the wave which was to be observed approached the vessel from ahead, at the word "let go" the line was allowed to run off the reel, and the bungs, with the line between them stretched straight, instantly remained stationary in the sea. The moment the wave lifted the first bung to its highest point was marked by my giving a "now," and the moment the second bung was raised to its highest point by the same wave a second "now." The first officer, who had a chronometer in his hand, marked the interval; it was found to be about 6 seconds. That is, the wave moved over 40 fathoms in 6 seconds, or 1 mile in 132 seconds, or about 27 miles in one hour. Each of us took the several places in turn of reel-holder, time-keeper, and observer; and the results were the same.

The half-wave would be in the process of generation until the pent-up waters were exhausted.

Major Cunningham states in his work on Ladak, that the mass of water which accumulated in 1841 and caused the inundation of the Indus in that year, was estimated at 20,000,000,000 cubic feet. This equals a volume 100 feet deep, 380 feet wide, and 100 miles long! If the flood of 1858 was only half of this or even much less, the reservoir was large enough to generate a half-wave of enormous length, and to produce a final free whole-wave much longer still.

As the Indus varies in width and depth, this wave would undergo various modifications as it passed down, especially as we must combine with it the natural downward current of the river—probably as much as from 7 to 10 miles or more at the season when the flood occurred. Thus at Attock where the river is confined at its usual level to a width of less than 800 feet by rocks there is no difficulty in assuming, that the elevation of the water would be greater than in other parts where the stream was wider.

5. The state of the Indus at Attock in ordinary years is this. The water is lowest in March. By the melting of the snow in May, and by the rains after that, the surface at Attock has risen by August through 50 feet above the lowest or winter level in March. The facts of the phenomenon of 1858, as observed by the late Captain Henderson at Attock (and recorded in the Journal for 1859, p. 199) were these. In August the river was unusually low for that season of the year, being only about 25 feet (instead of the usual 50 feet) above the winter level. On the 10th August at 6 A. M. the water began to rise, and in the first, second, third, and fourth hours rose through 26,12,7,4 feet, and in the next three hours and a half through 6 feet, so as at 1½ P. M. to stand at 80 feet above the winter level. After this, it began very slowly to subside and returned to its usual level in about (say) 22½ hours, making 30 hours for the whole rise and fall of the water at Attock. The rise occupied one-fourth of this time, and the fall three-fourths. This accords with the form of the wave, the slope of which on the back is much longer than the rise on the front, as explained in para. 2, and represented in fig. 3.

6. The difficulties in the way of receiving this explanation arise from the possible shallows and rapids and sudden bends in the river,

and the consequent checks and friction which might materially interfere with the motion and maintenance of the wave. It may be said, however, on the other hand, that the catastrophe occurred at the season of the year when the river is fullest of water; and although in 1858, even in August, the river was as low as to be only 25 feet (instead of 50 feet) above winter level, nevertheless there must have been a considerable amount of water in the river before the flood came, sufficient very likely for the generation and propagation of the wave. Here, however, is a ground of uncertainty. But even if it were admitted that some impediment of the kind existed between the broken barrier and Attock, yet the influx of waters would at length rise over the impediment like an ordinary rush of water on a much swollen river, and commence to generate a wave in the river below the impediment, as the influx of the tidal water at the sandheads produces a tidal wave.

7. We may understand how the water which the wave had raised just above the impediment would get over the impediment into the part of the river below it, ready to produce another wave by its pressure, by observing the breakers of the Bore in the Hooghly. The Bore is simply the flood-tide-wave moving along the river at the springs at which season the influx at the sandheads is greatest. The onward movement of this wave or form at the rate of 24 miles an hour is accompanied (as stated in para. 1) by an upward and onward movement of the parts of the water itself in the front of the wave, though at a much smaller rate than that of the form or wave itself. Conceive this wave coming suddenly from deep water into shallow. What will take place at the boundary line between deep and shallow water? The pressure lifts up the water on the deep side of the boundary line and so forms the front of the great tidal-wave at that spot, and at the same instant gives the water thus lifted up a slight onward motion, which carries it on to the shallow side of the boundary line between the deep and shallow parts. The pressure-action by which the wave should be propagated onwards over the flat is now destroyed; for the upheaved water thus lifted up over the shallow has nothing but the hard bottom to press down upon, and this unyielding bottom will not communicate the pressure onwards (as it would if it had been itself water) to keep up the formation of a wave

ahead. Hence the water, lifted upon the shallow bottom by the action of the wave moving up to the boundary line, will move on over the shallow with its own proper onward motion already acquired, increased by the action of gravity upon the unsupported front of the mass which has found its way, as described, upon the shallow. The water thus heaved up by the wave from the deep side is, so to speak, poured out upon the shallow, and it rushes along over the flat in a running torrent of breakers, till it covers it over with water to the level of the rest of that part of the river now swollen by the flood which is come in.

The violence of this process will depend very much upon the form of the bottom of the river, and the degree of abruptness of the transition from deep water to shallow. If this transition is gradual, the advancing wave will be reduced gradually by the increasing friction of the bottom; and the resisting pressure caused by the bottom (as it inclines up and so faces the wave) will reduce the action, and when the wave does break, if it break at all, it will do so feebly, like ordinary waves on the sea-shore. If, however, the transition be abrupt from deep water into shallow, the action will be as described above in explaining the Bore. This description will show why the phenomenon is so much more sensible when the Hooghly is full of water, in the freshes, than in the dry season. In the dry season the river lies down in the deep channel, and when the accession of water at the spring tides lifts it up, the highest part only of the tidal-wave rises above the flats or shallows, and runs on them, therefore, without violence. But when the river is full, the general level is raised higher than in the dry season and the flood-wave at the springs is bodily raised up above the level of the flats and falls upon them, and rushes over them with a correspondingly greater violence.

This digression about the Bore will serve to illustrate the action of the wave in the Indus when it reaches an impediment stretching across its breadth, such as a fordable shallow, or a rapid caused by broken rocks on a descent. The wave will break, and rush over the impediment (aided in this case by the downward current of the stream) in a torrent of breakers, and the mass of waters, on arriving at the deeper water below the impediment, will again form

a wave by the pressure-action, though not so large as the previous one, because some force will have been destroyed by impact and friction.

8. If the barrier, causing the accumulation of waters, occurred on the main-stream, it might be objected, that, owing to the long stoppage of the supply, there could not have been water enough below the barrier for the descending mass to impinge upon and produce the wave. In this case the mass would rush down the dry or almost dry channel, and as soon as it came to a part of the river where (from its tributaries) the depth of water was sufficient, the sudden influx of the flood would by its weight press downwards and cause the wave to spring up ahead and run down the stream as already described, exactly as the tidal-wave is formed.

9. The reasons which favour the hypothesis of the wave-explanation are these :

(1.) Captain Henderson, who appears to have been the only European who observed the disturbance of the river, inclines to a velocity which accords more with the notion of a wave of water than with that of the water itself rushing down at such a speed: see Journal, 1859, p. 207.

(2.) In his account he says (p. 208) "at first it [the water] came welling up quietly, but very rapidly." This looks much more like the uplifting of the surface by a pressure from below, than the rush of water down the river.

(3.) He tells us in his account (p. 208) that four hours after the rise began, and three hours and a half before the maximum rise was attained, he crossed the river in a boat. This he hardly could have done had the waters of the swollen river been moving down bodily at the wave's velocity.

10. Mr. Obbard in his paper attributes the low state of the river at Attock before the flood came, to the hollow which precedes a wave, like the tidal-wave in the Hooghly, and he takes the existence of this depression to be an argument in favour of his explanation. But this would rather appear to have arisen from the stoppage of the full supply of water in consequence of the dam being formed: and it is evident that there was no *cause* producing a hollow in the process explained above by which the wave was generated.

For example, in the illustration I have given above, if the plug began to rise again after it had reached the bottom of the river, a hollow wave *would* be formed by the rushing back of the water to supply the vacuum caused under the plug. The hollow wave thus produced is analogous to the convex wave, and would run along the canal after the convex wave. If the plug were thrust down again and then raised again, another pair of convex and concave waves would be formed. If the rise and fall of the plug occupied six hours each, the action would be like the influx and withdrawal of the tidal mass of water at the Sandheads from the Bay of Bengal, and the convex and concave waves would represent the high and low tides. In this mode of action a concave or hollow always precedes, as well as follows, a convex wave.

But in the case of the Indus there was only the *addition* of a mass of water to the river as it was before the catastrophe took place and the wave was formed, and no subtraction of water. A wave of *elevation only* was, therefore, formed, which ran down the river and passed off into the sea, spending much of its strength no doubt on the way, and in part perhaps restoring the lost level which had arisen from the stoppage of the supply.

On the Flat-horned Taurine Cattle of S. E. Asia ; with a Note on the Races of Rein Deer, and a Note on Domestic Animals in general.—By ED. BLYTH.

The species of Bovine animals (so far as known), whether recent or fossil, resolve into three primary groups : viz.

I. *Bisontine*. II. *Taurine*. III. *Bubaline*. Two of these groups being again divisible as follow.

I. *Bisontine* (adapted for a frigid climate). Subdivided into—
1. OVIPOS (the ‘Musk Ox’ of the Arctic ‘Barren grounds’ of America ; but which, formerly, during the glacial epoch, was far more extensively diffused, remains of this animal having been met with in

the British islands*.)—2. BOÖTHERIUM; extinct (founded on two specific races, one of which is the *Ovibos Pallantis* of de Blainville, and the other is the *Bos bombifrons* of Harlan).—3. BISON (the well-known broad-fronted and shaggy Bisons of Europe and N. America, and formerly of N. Asia).—4. PÖEPHAGUS (the Yak of high Central Asia). To this *Bisontine* division pertain the only indigenous Bovine quadrupeds of America.

II. *Taurine* (with the exception of the humped cattle suited to a temperate climate and restricted to mountainous countries within or near the tropics). Subdivided into—1. ZEBUS (the Zebu or humped cattle of the hotter regions of Asia and Africa). 2. TAURUS (the humpless cattle with cylindrical horns).—3. GAVÆUS (the humpless cattle with flattened horns, peculiar to S. E. Asia).

III. *Bubaline* (the flat-horned, thinly clad and thick-skinned, wallowing† cattle of Asia and Africa). Comprising only—1. BUBALUS (the Buffaloes, including the Anoa of Celebes).

According to the views so very ably expounded by Mr. C. Darwin, all the species of one genus have a common origin in the depths of time, and we may ascend in the generalization to any extent, needing only unlimited lapse of time for the ever accumulating development of small variations in any particular direction, under the unconscious guidance of the law of Natural Selection. *Species*, as he maintains, are only strongly marked *varieties*, and *varieties* he designates as *in-*

* As also of the Caribou, or present barren-ground race or variety of the Rein Deer; though I am far from being satisfied that this barren-ground race differs in any respect from the *wild* Rein Deer of Lapland, or of the 'tundras' of Arctic Siberia; while I much suspect that the large race or variety of Rein Deer which is ridden by the Tungusi and other Siberian tribes, (and to the backs of which the bales of goods are annually transferred, in Manchuria, from those of two-humped Camels,) to be similarly identical with the Woodland Caribou of North America. The subject of the races of Rein Deer will be more fully treated of in the sequel.

As the above is passing through the press, I learn, from Lord Wrottesley's Address to the British Association at Oxford (June 27th, 1860), that Dr. H. Falconer, "aided by Col. Wood, of Glamorganshire, has recently extracted from a single cave in the Gower peninsula of South Wales, a vast quantity of the antlers of a Rein Deer (perhaps of two species of Rein Deer), both allied to the living one. These fossils are most of them shed horns; and there have been already no fewer than 1,100 of them dug out of the mud filling one cave."—*Athenæum*, June 30th, 1860, p. 890.

It is remarkable that *URSUS ARCTOS* of the major continent should, in America, be restricted in its range to the Arctic barren-grounds.

† The true Bisons wallow during the summer.

incipient species; and most assuredly the dividing line between what are variously accepted as *species* or as *varieties* cannot oftentimes be traced: nevertheless, it is admitted by Mr. Darwin that the mass of what are generally considered as species have acquired a high degree of persistency, and arguments *pro* and *con* are abundantly supplied by the Bovines, as by endless other groups: on the one hand, we have the multitudinous races of cylindrical-horned domestic cattle, whether humped or humpless, which surely no naturalist would go the length of supposing to be so many separate and distinct creations; and, on the other hand, we have the phenomenon of three wild species, or most strongly characterized races (more strongly characterized apart than are any of the domestic races of humped or humpless Taurines respectively), yet exhibiting many peculiarities in common, inhabiting to a great extent the very same region, but maintaining their distinctive characters wherever found, and never (so far as known) hybridizing one with another, though at least two of them have interbred in a state of domestication (and one of them even in the wild state) with the ordinary tame humped cattle of the tropical regions of the major continent.* All three are *domesticable*, as will be shewn; and as regards the reputed indomitable nature of one of them, the gigantic Gaour (G. GAURUS), we have only to reflect on the fact, how very readily the tamest and one of the most thoroughly and completely domesticated of all tame creatures, the humped Ox (BOS or ZEBUS GIBBOSUS) relapses into a condition of feral wildness, unsurpassed even by the Gaour itself, and assuredly beyond that of the renowned Chillingham cattle of Northumberland, if not also of the feral humpless cattle of S. America and elsewhere.†

* The *Bos sylhetanus*, F. Cuv., is founded upon a hybrid Gayál (G. FRONTALIS) of this kind; and the *B. leucopymnos*, Quoy and Gaynard, upon a hybrid Banteng (G. SONDAICUS). Sir T. Stamford Raffles remarks, in his *History of Java*, that "the degenerate domestic cows [of that island, humped,] are sometimes driven into the forest to couple with the wild Banteng, for the sake of improving the breed." Baron Cuvier supposed that the true Gayál was a hybrid between the humped cattle and the Buffalo; but he seems to have known only the hybrid animal, from the description and figures sent by M. Duvaucel and published by his brother in the *Mamm. Lithog.*

† How readily European cattle resume the wild habit, is shewn by the following passage in Mr. S. Sydney's excellent work, 'The Three Colonies of Australia' (1852), p. 314. "The cattle in bush re-acquire in many respects the habits of their wild progenitors; such is the habit of camping, and such, too, the manner in which, like the wild [feral] cattle of Chillingham park in Northumber-

The humped cattle are unknown in an aboriginally wild state; and I am strongly of opinion that they will prove to be of African rather than of Asiatic origin, however ancient their introduction into India; for no fossil or semi-fossil remains of this very distinct type have as yet been discovered in any part of Asia, where the only established fossil *Taurine* is the *BOS NAMADICUS* of the Nerbudda deposits, which is barely (if at all satisfactorily) distinguishable from the European *B. PRIMOGENIUS* (or true *Urus* of Cæsar).* It

land, they march in single file to water, the bulls leading; so, too, when threatened, they take advantage of the inequalities of the ground and steal off in their hollows unperceived, the bulls, if attacked by dogs, bringing up the rear."

In the Swan River colony, both horses and horned cattle have gone completely wild, and Buffaloes in the vicinity of Port Essington. *Vide* Leichardt, in *Journ. Roy. Geogr. Soc.* XVI, 237.

(What are the wild cattle of Albania noticed by Count Karact in *Journ. Roy. Geogr. Soc.* XII, 57? Also, what were those hunted by the ancient monarchs of Assyria, as represented in the Nineveh sculptures? What, indeed, were the *Uri Sylvestres* which haunted the great forests that surrounded London in the time of Fitzstephen, *i. e.* about 1150 *A. D.*? The late Jonathan Couch remarked, in his '*Cornish Fauna*' (1838), that—"The ancient breed in the west of England was called 'black cattle,' from the very dark appearance of its coat, almost like velvet: circumstances in which it seems to have differed from the races of the north of England, which were white)."

* I refer more especially to the later or post-pliocene (*pleistocene*, or even recent) type, the remains of which are found in almost modern lacustrine deposits, where likewise occur those of *BISON EUROPEUS* of the existing type, as distinguished from the wide-horned *PRISCUS* type. This later form of *PRIMOGENIUS* (which is that originally so named by Bojanus) absolutely resembles the most finely developed examples of certain (*unimproved*) domestic races of large and very-long-horned cattle, except that the size is fully one-third larger, as remarked by Professor Nilsson. In like manner, Mr. Hodgson notices, of the Indian Buffalo, that—"The wild animals are fully a third larger than the largest tame breeds [in India], and measure from snout to vent $10\frac{1}{2}$ it. and 6 to $6\frac{1}{2}$ ft. high at the shoulder." (*J. A. S.* XVI, 710). The older type of *PRIMOGENIUS* occurs in the pliocene drift, together with *BISON PRISCUS*; and (so far as I have seen) the size of the skull is smaller than in the other, but the horns are still larger, and curve round more towards each other at the tips; moreover (if I mistake not), they are both thicker and longer in the bull than in the cow, whereas in the more modern type (as in domestic cylindrical-horned cattle, whether humped or humpless,) they are thicker but shorter in the bull, longer and more slender in the ox and cow. With the exception of the Indian Buffalo to some extent, I know of no other true bovine in which the horns are not both thicker and longer in the bull! In the old type of *PRIMOGENIUS*, the horn-cores are sometimes enormous. I have measured a pair which were 3 ft. long and 19 in. round at base. Another of the same linear dimensions, but 18 in. in circumference at base, is noticed in the *Ann. Mag. N. H.* Vol. II (1838), p. 163. I have drawings of a fine frontlet of perhaps a cow of this race, which was found in the gravel when digging the foundations of the houses of parliament. Of the later race, compare the noble Swedish bull-skull figured in *Ann. Mag. N. H.*, 2nd series, IV, 257, 259, with the superb Scottish cow-skull in the British

need hardly be remarked that the humped type of domestic cattle is generally diffused over the hotter parts of Africa, from east to west or ocean to ocean, and on the eastern side as far south as Natál, and throughout Madagascar; the same being the only Taurine type known in Arabia,* though, curiously, in the essentially Arabian island of

Museum, figured in Prof. Owen's 'British Fossil Mammals and Birds,' 498, 507. The latter measures just $2\frac{1}{2}$ ft. from vertex to tips of intermaxillaries. Compare also Prof. Owen's figure of *BISON PRISCUS* with Prof. Nilsson's figure of the modern type of European Bison from the Swedish peat (p. 490 and p. 415 of the same Vols. respectively). Whether the latter has occurred in the British Islands I am unaware; but suspect that it does not, or at least that it has not been recognised hitherto.

Perhaps the latest (though vague) notice of the Urus, as an existing animal, occurs in Bell's 'Travels in Tartary,' Vol. I, Ch. III, p. 223: "Journey from Tomsky to Elimsky, in the country of the Tsuliam Tartars." It seems to me to refer more probably to the wild *taurine* Urus than to the Bison; but in either case the notice is sufficiently remarkable. "On the hills, and in the woods near this place, are many sorts of wild beasts; particularly the Urus, or Uhr-ox, one of the fiercest animals the world produces. Their force is such, that neither the Wolf, Bear, nor Tiger, dares to engage with them. In the same woods," Bell continues, "is found another species of Oxen, called *Bubul* by the Tartars. It is not so large as the Urus; its body and limbs are very handsome: it has a high shoulder and flowing with long hair growing from the rump to its extremity, like that of a Horse. Those which I saw were tame, and as tractable as other cattle." Certainly a remarkable notice of the Yak, both wild and tame (as it would seem), in a region where that animal is at present unknown. The word *Bubul* has probably its connexion with *Bubulus*.

The difference in the development of the wild and tame Buffalo of India is equally observable where the two frequent the same pastures and commonly interbreed; and I believe the main reason of it to be, that the tame calves are deprived of their due supply of milk. The importance of an ample supply of nourishment in early life, as bearing on the future development of any animal, cannot be over-estimated. A friend remarked to me that he had no idea of what a fine Buffalo was, till he saw those of Burmá. They are there, he states, much larger than in Bengal, with splendid horns, and altogether a vastly superior animal. The Burmese never milk them; having the same strange prejudice against milk which the Chinese have, though otherwise both people are nearly omnivorous. There is a corresponding difference of development in the wild and tame races of Yak, and of Rein Deer in Lapland,—doubtless for the same reason.

* The humped cattle of Arabia generally are "of a very small and poor race, and are never, but with the greatest reluctance, killed for food." (Wallin, in *Journ. Roy. Geogr. Soc.*, Vol. XXIV, 148.) Chesney remarks of them, that "bulls and cows take the next place to the Buffalo, and, like those of India, they bear a hump, and are of small size; some bullocks purchased at Suweideyah, produced, each, only about 224 lbs. of meat." Again, in his Appendix (Vol. I, 279), he enumerates, among the domestic animals of Arabia and *Mesopotamia*, "both the common bull and cow, and the bull and cow with hump." In the province of Kerman, in Persia, Mr. Keith C. Abbot remarks that "the oxen of this part of the country are of a small humped kind, and are commonly used as beasts of burthen; people also ride on them, seated on a soft pad, and a rope is passed through the nostril, by which they are guided." (*Journ. Roy. Geogr. Soc.*, Vol. XXV, 43.)

Socotra, the cattle are of the humpless European or N. Asiatic type.* Both humped and humpless cattle are represented in the old Egyptian paintings; and the humpless reappear in S. Africa, in the remarkable indigenous (so far as known) Caffre cattle, and I have seen fossil remains of the same cylindrical-horned humpless type from the banks of a tributary of the Gariep river.† In Madagascar, also, where the tame cattle

* *Vide* Wellsted, in *Journ. Roy. Geogr. Soc.* V, 200. On the confines of India, this European and also Tartar type of humpless cattle comes round, evidently from the eastward, into Butan. But the Chinese Taurines (so far as I can learn) are mostly hybrid, being variously intermediate to the humped and humpless species: except, however, towards the north; and huge herds of splendid Tartar cattle are pastured beyond the great wall of China,—many of these, with vast troops of horses, &c., being the property of the emperor. (*Vide* Timkowski and others.) According to Major R. C. Tytler, a white breed of humpless (?) cattle is reared and highly prized by the natives of Dacca, who never turn them out to pasture. It has “little or no symptoms of a hump.” *Ann. M. N. H.* 2nd series, XIV (1854), 177.

† *Vide Proc. Geol. Soc.* 1840, p. 152. Capt. Speke observed some very fine humpless cattle on the N. W. shore of the Tanganyika lake, near the equator. “Very large cattle, bearing horns of stupendous size. They are of an uniform red colour, like our Devonshire breed, but attain a much greater height and size.” Northward, again, on the shore of his grand Victoria Nyanza lake, he remarks that—“The cows, unlike the Tanganyika ones, are small and short-horned, and are of a variety of colours. They carry a hump, like the Brahmini bull, but give very little milk.” *Vide* ‘Blackwood’s Edinburgh Magazine,’ No. DXXVIII (October, 1859), pp. 392, 398. A little further northward, in the Bari country on the shores of the White Nile, between 4° and 5° N. lat., M. Ferdinand Werne tells us—“We remark, as usual among the light-coloured cows, many quite white, and few black or dapple. The bulls have the customary high and thick humps; the cows, on the contrary, have exactly the appearance of those at Emmerich on the Rhine [?]; their horns are twisted in a surprisingly handsome form, and set off with flaky hair, as well as the ears. They carry the latter erect, by which means the head, and the lively eye, acquire a brisk and intelligent expression.” (Werne’s *Narrative of Expedition to discover the Sources of the White Nile, in the years 1840, 1841*, O’Reilly’s translation, II, 94.) It is not likely that the cows referred to should be entirely humpless; and the large lustrous eye is everywhere one of the many characteristics of the humped species, as is the lanceolate form of ear (which I suppose is referred to), as contrasted with the broad round ears of the humpless kind; and in hybrids of different degrees of admixture the proportion is more readily seen in the shape of the ear than in aught else. Moreover, it seems that, as in India, white or greyish-white humped cattle predominate; but the black tail-tuft is constant, except in the rare case of an albino. Between 6° and 7° N. lat., among the Kek or Kiak nation, we learn, from the same authority, that—“The cattle are generally of a light colour, of moderate size, and have long beautifully twisted horns, some of which are turned backwards [as also in India]. The bulls have large speckled humps, such as are seen in the hieroglyphics; the cows, on the contrary, only a little elevation on the shoulders.” (*Ibid.* I, 175.) As with the humped cow elsewhere; and when Col. Sykes mentions that this species of cattle, “when early trained to labour or to carriage, is nearly destitute of the hump” (*Proc. Zool. Soc.* 1831, p. 105), he refers to cows and oxen only; for the labouring bull has always a well developed hump, especially if well fed, and this has much to do with the filling out of the hump in oxen and

are all of the humped kind, a humpless wild race, not yet scientifically described, was long ago indicated by Flacourt, and since by the missionary Ellis; stated to resemble European cattle except in having longer limbs.* But to return to the humped cattle. These are now the ordinary Taurines of tropical and subtropical Asia, and according to Kæmpfer extend on to Japan. Though unknown in an aboriginally wild state, the species has relapsed into wildness in various parts of India, as especially in Oudh and Rohilkund, in Sháhábád, in Mysore, and even in Ceylon; a fact the more interesting, as proving (what had been doubted) that these humped cattle can maintain themselves, unaided by man, in regions inhabited by the Tiger. The origin and history of the wild herds of the Sháhábád jungles, which still exist, are given by Dr. F. Buchanan Hamilton,† who remarks that—"In the woods of Jagadisipur and Damraong are some wild cattle of the common breed: they resemble entirely in form and in variety of colours‡ those bred about the villages of this district,

cows: the fundamental structure is there invariably, and capable of development. The huge-horned Bornouese and Galla races of cattle are of the humped species, —unlike the fine Tanganyika race "with stupendous horns." Indeed, cattle exceedingly like the African Galla race of Bruce and Salt are by no means very rare in India.

It is remarkable that the singular *strepsicerine* or Cretan breed of Sheep exists in the country drained by the White Nile; modified, however, in its fleece by the locality. Thus, Werne tells us (II, 18), that—"I purchased for a couple of miserable beads a little Sheep, covered partly with wool and partly with hair, as the Sheep here generally are, with a long mane under the throat, and horns twisted back. Selim Capitan says that a similar species [race] is found in Crete." Elsewhere (p. 97), he remarks "Rams with horns twisted back and manes,"—the latter, of course, *under* the throat, as mentioned in the preceding notice.

* "Horned cattle are numerous, both tame and wild; many of the latter resemble, in shape and size, the cattle of Europe." (Ellis's *History of Madagascar*.) These wild cattle abound in the province of Mena-bé, which occupies much of the western portion of the island. In Mr. J. A. Lloyd's *Memoir on Madagascar*, published in the 20th Vol. of the *Royal Geographical Society's Journal*, we read (p. 63) that "the northern part of Mena-bé contains great numbers of wild cattle; Radáma and his officers, in one of their warlike expeditions amongst the Sakalami, passing through this country, killed upwards of 340 [wild?] oxen in one day for the use of his army, and two days afterwards 431 more were killed by the soldiers."

† Montgomery Martin's compilation from the Buchanan Hamilton MSS., Vol. I, 504.

‡ Major W. S. Sherwill, who has often shot over the now famous "Jugdespur jungle," by permission of the late Kumár (or Kooer) Singha, who allowed him to shoot what he pleased so long as he spared the wild cattle, informs me that, while, of course, respecting the Rája's injunction, he was curious about these cattle, and had opportunities of watching them somewhat closely. All he saw were rather of small size and of an earthy-brown colour, with shortish horns,

but are more active, and very shy. The Rájá of Bhojpur, and his kinsman Sáhebzádeh Singha [as of late Kumár Singha, the notable rebel], carefully preserve them from injury; and say, that owing to the encroachments of agriculture the number is rapidly diminishing. Many of their neighbours, however, alleged that the devastation committed by these sacred herds was very ruinous, and every year occasioned more and more land to be deserted. The origin of these herds is well known. When the Ujayáni Rájputs incurred the displeasure of Kásim Ali, and for some years were compelled to abandon their habitations, some cattle were left in the woods without keepers; and on their owner's return had acquired the wild habits, which their offspring retain. Several calves had been caught; but it has been found impossible to rear them, their shyness and regret for the loss of liberty having always proved fatal. This shows what difficulties mankind must have encountered in first taming this most useful animal," &c. &c. The extreme wildness of the feral cattle of Oudh is noticed by Capt. (now Col. Sir T. Proby) Cautley, in *J. A. S.* IX, 623. "In the districts of Akharpur and Doolpur, in the province of Oudh," he remarks, "large herds of black oxen are, or were, to be found in the wild uncultivated tracts, a fact to which I can bear testimony from my own personal observation, having, in 1820, come in contact with a very large herd of these beasts, of which we were only fortunate enough to kill one; their excessive shyness and wildness preventing us from a near approach at any second opportunity." Another writer notices herds of these feral humped cattle on the road from Agra to Bareilly; and, from all recent accounts, they seem to be on the increase rather than on the decrease.*

and he thinks without the *Nil-gai* markings on the feet (which are often seen in domestic humped cattle). Whether the Oudh herds tend to uniformity of colouring I am unaware. The feral herds of humpless cattle in S. America are, I believe, of various colours, like their domestic Spanish progenitors.

* In an article "On the Future of Oudh" (published in the *Morning Chronicle* for May 17th, 1859), it is remarked that "The forests, and notably among them that of the Tarai, towards Nipal, serve as a shelter for innumerable wild cattle, which are admirably suited for artillery bullocks and other laborious purposes, besides affording excellent fire-wood and pasture for cattle, and also hunting-ground for the sportsman. In these forests, and in the extensive jungles, are to be found the hides and horns of thousands of wild cattle, rotting, as it were, for want of hands to turn them to account, and which alone would prove a most remunerative branch of commerce, to judge from the success which the very few who

With this fact, therefore, to bear in mind, the excessive shyness and wildness of the feral herds known to be descended from domestic humped cattle, and also the fact (which I and others know from experience) of the extreme difficulty there is in subduing the wild propensities of the common Bengal Jungle-fowl (*GALLUS FERRUGINEUS* v. *bankivus*), from which wild species all the races of domestic poultry are as clearly derived as are those of tame Ducks from the Mallard, we are quite justified, I think, in withholding assent to the current opinion that the Gaour (*BOS GAURUS*), or any kindred species, is incapable of domestication.

have attempted to realize this branch of commerce, have met with. From the same source tallow might be obtained in abundance, were there only a few speculators to inaugurate the trade, and to direct it into the natural channels for its development."

The making over of a considerable portion of the Tarai region to a Hindu Prince (Jung Bahádur) will, of course, tend to a further preservation of these feral cattle. Another and more remarkable locality where many beasts of the sort (and of various colours) are little molested, is the *churr* or alluvial island known as the Siddi *churr*, lying S. E. of Noacolly in the eastern Sundarbáns. On this *churr* there is no high tree-jungle, and scarcely brushwood enough to afford cover for Tigers, which do not occur on the island.

It is probable that such feral herds occur also in Africa. Thus, in some "Notes on an Expedition down the Western Coast of Africa to 'the Bijuga Islands,' and the recently discovered river Kiddafing," by Col. L. Smyth O'Connor, C. B., F. R. G. S., communicated by the Colonial office to the Royal Geographical Society, and published in its Journal for 1859, p. 384, it appears that in the island of Ovanga "the finest Oxen are wild in innumerable herds." In general, however, the notices of wild cattle in Africa refer either to—1. *Bubaline* species,—2. Gnus (*CATOBLEPAS*), or 'wilde beests' of the Dutch colonists,—3. Species of the Hartebeest group, as especially *ACRONOTUS BUBALIS* in N. Africa,—4. Even the *Leucoryx* and kindred Antelopes. As an illustration of this vague application of names, Capt. Lyon mentions a chain of mountains to the south of Fezzan, named *Wadan*, "on account of the immense number of Buffaloes to be found there, and which are of three species, viz. the *Wadan* [*OVIS TRAGELAPHUS*!], an animal of the size of an Ass, having very large (or, as is elsewhere stated, very long, heavy) horns, and large bunches of hair hanging from the shoulder, to the length of 18 in. or 2 ft.; they have very large heads, and are very fierce. The *Boqua-el-Weish* [*ACRONOTUS BUBALIS*?], which is a kind of Buffalo, slow in its motion, having very large horns, and being of the size of an ordinary cow; and the White Buffalo [*ORYX LEUCORYX*!], of a lighter and more active make, very shy and swift, and not easily procured. The calving-time of these animals is in April or May." (*Travels in N. Africa*, pp. 76, 271.) Dr. Barth notices the *OVIS TRAGELAPHUS* by the name *Wadan*. "Wild Oxen" of some sort are stated to inhabit the country bordering on the river Koanza. (*Journ. Roy. Geog. Soc.* XXIV, 272.) Capt. Burton, also, in his recently published work, 'The Lake Regions of Central Africa,' notices that—"The park-lands of Dúthumi, the jungles and forests of Ugogi and Mgunda Mk'hali, the barrens of Usukuma, and the tangled thickets of Ujiji, are full of noble game—Lions and Leopards, Elephants and Rhinoceroses, wild cattle (Buffaloes?), Giraffes, Gnus, Zebras, Quaggas, and Ostriches." Gnus, at least, being here discriminated.

From accounts of the savage nature of the wild Yak, the same might have been inferred of that species, which we know to be extensively domesticated; or, if we were only acquainted with the wild Rein Deer as it exists in arctic America, the varied applicability of the domestic herds of the corresponding regions of the major continent would scarcely have been predicated. So with the African Elephant in modern times, as compared with the Asiatic Elephant!* Civilized man, as a rule, exterminates but does not domesticate—has not hitherto done so at least, whatever efforts may of late have been made (with but moderate result hitherto) by the Acclimation and different Zoological Societies. A cultivated country, however, is ill adapted for such experiments. Wild animals are rather to be won over, by degrees, in their indigenous haunts, where their habits of life are little changed by domestication, and their food continues to be that to which the race is accustomed: their subjugation being accordingly effected by human tenants of the same haunts, who can hardly have emerged from savagery, but are practically familiar with the habits of the creatures they seek to subdue. It is thus that the three species of known wild Asiatic Taurines with flattened horns have (each of them) been domesticated, to a greater or less extent, in their own wildernesses. A few calves may have originally been caught and tamed, and some stock established; but how entire herds of full-grown wild animals may be won over and gradually domesticated, is thus told by Mr. McRae in *Lin. Tr.* VII, 303 *et seq.* The Gayál or *Mit'hun* (*GAVEUS FRONTALIS*) being the species referred to.

“The Kukis have a very simple method of training the wild Gayáls.

* In a letter just received from Sir J. Emerson Tennent, I learn that the Elephant of Ceylon is considered to be identical with that of Sumatra (!), which is adjudged to be a peculiar species (intermediate to the existing African and Indian Elephants) by Prof. Schlegel and the late Prof. Temminck, as also by the late Prince of Canino. At all events the Sumatran Elephant is described by three or four authors, to whom I have had access, to bear generally fine tusks (*i. e.* the males), whereas a fine tusker is exceptional in the instance of the Elephant of Ceylon. Sir J. E. Tennent's elaborate and most interesting series of chapters on the great proboscidian discloses certain facts, on the *family resemblances* of particular herds of Elephants, which will not fail to interest the disciples of Mr. C. Darwin. How about the Elephants of the Malayan peninsula; if not also of the Indo-Chinese countries, as far at least as Cochin-China? I am trying to obtain grinders, *i. e.* molar teeth, in the hope of coming soon to some understanding in the matter.

It is as follows :—On discovering a herd of wild Gayáls in the jungles, they prepare a number of balls, of the size of a man's head, composed of a particular kind of earth, salt, and cotton; they then drive their tame Gayáls towards the wild ones, when the two soon meet and assimilate into one herd, the males of the one attaching themselves to the females of the other, and *vice versá*. The Kukis now scatter their balls over such parts of the jungle as they think the herd most likely to pass, and watch its motions. The Gayáls, on meeting these balls as they go along, are attracted by their appearance and smell, and begin to lick them with their tongues; and relishing the taste of the salt, and the particular earth composing them, they never quit the place until all the balls are destroyed. The Kukis having observed the Gayáls to have once tasted their balls, prepare what they consider a sufficient supply of them to answer the intended purpose, and as the Gayáls lick them up they throw down more; and to prevent their being so readily destroyed, they mix the cotton with the earth and salt. This process generally goes on for three changes of the moon, or for a month and a half; during which time the tame and wild Gayáls are always together, licking the decoy balls; and the Kuki, after the first day or two of their being so, makes his appearance at such a distance as not to alarm the wild ones. By degrees he approaches nearer and nearer, until at length the sight of him has become so familiar that he can advance to stroke his tame Gayáls on the back and neck without frightening away the wild ones. He next extends his hand to them, and caresses them also, at the same time giving them plenty of his decoy balls to lick; and thus, in the short space of time mentioned, he is able to drive them along with his tame ones to his parrah or village, without the least exertion of force or compulsion; and so attached do the Gayáls become to the parrah, that when the Kukis migrate from one place to another they always find it necessary to set fire to the huts they are about to abandon, lest the Gayáls should return to them from the new grounds, were they left standing. Experience has taught the Kuki the necessity of thus destroying his huts."

In at least some of the hill-ranges bordering the Brámaputra valley on its left, where Gayáls are extensively domesticated by the

mountaineers, they have been so far influenced as to vary considerably in colour, whatever may be the cause of such variation. Thus, amongst the Meris, Lieut. Dalton tells us that—"The *Mit'hun* (or Gayál) is the only species of horned cattle possessed by the Meris. It is rather a clumsy-looking animal in make; but a group of *Mit'huns* grazing on the steep rocky declivities they seem to love, would be a noble study for Landseer: some are milk-white, some nearly black, some black and white, and some red and white."* Elsewhere, the herds of tame Gayáls shew generally a few individuals a little pied or splashed with white, with not uncommonly a white tail-tuft; and they cannot be expected to vary much further than this, unless subjected to new influences, and above all to that of selection in breeding under human superintendence. In the Mishmi hills wild Gayáls are still numerous; † but we know little of this species excepting on the outskirts of its range, where its native hills impinge on British territory. ‡

The Rev. J. Barbe, R. C. M., who seems to have penetrated further into the interior of the Tipperá and Chátgaon (or 'Chittagong') hills than any other European, even to the present time, remarks, in an account of his tour into the latter territory in 1844-45, § that—"the Gayál, *Bos frontalis*, is found amongst the hills, particularly to the south of Sitacra: there are two species, differing in size and [a] little in colour: the large one is of a dark brown, and the male

* *J. A. S.* XIV, 265.

† *Ibid.* XIV, 495.

‡ The *Gayál* of Bishop Heber's Journal, which that much respected prelate saw in Barrackpore park, was of course the *GAVÆUS FRONTALIS*. But the figure and description given are monstrous, and were obviously got up from extremely vague recollection: the horns turn down instead of up, the space between them is narrow instead of being very broad, the heavy dewlap is not given, nor the white *stockings*; the tail is figured and described as "bushy," and as extending below the hocks; and the outline of the spinal ridge is utterly unlike what it should be. He says—"It is very much larger than the largest Indian cattle [he could not then have seen an ordnance bullock], but hardly, I think, equal to an English bull [!]: its tail is bushy [!], and its horns form almost a mass of white and solid bone to the centre of its forehead [!]" He could only have viewed the animal from a distance, and have mistaken the pale colour of the forehead for a continuation of the bases of the horns. Neither is it, as he remarks, "a native of Tibet and Nipal," nor even of Butan (*vide* Turner's Embassy). The second figure in the distance is meant, we can only suppose, to represent a large humped Ox; but here, again, the animal is furnished with a Horse's tail, and is like nothing in nature! Our utmost respect for the reverend Bishop can scarcely pardon him such outrageous caricatures, both of figure and description. *Vide* Heber's *Journal*, 1, 31.

§ *J. A. S.* XIV, 386.

is nearly as high as a female Elephant: the small one is of a reddish-brown; it is the Tenasserim 'Bison,' and the Arakanese call them by the same name as the Burmese do. These Gayáls are perfectly distinct from the *Shio* of the Kookies, which are smaller, have a projecting skin to their neck, and differ also by the form and direction of their horns." Now the *Shio* or *Shiál* of the Mughs is, for certain, the true Gayál (*G. FRONTALIS*),* as indeed indicated by the "projecting skin to their neck;" this species having the dewlap much more developed than in the Gaour (*G. GAURUS*) and Banteng or *Tsoing* (*G. SONDAICUS*), which last I believe to be M. Barbe's smaller species "of a reddish-brown," as I have ascertained his larger species to be the Gaour (which has hardly even a trace of dewlap). But the Gaour and not the Banteng is the 'Bison' of Anglo-Indian sportsmen on both sides of the Bay of Bengal;† the Banteng being currently known as the 'wild Ox' of the Indo-Chinese countries. M. Barbe has therefore erroneously identified his *smaller* kind with the Tenasserim 'Bison,' and is also wrong in applying the name *Bos frontalis* to either of his species, as obviously so to both of them.

Soon after the publication of the foregoing notice, I had some conversation on the subject with M. Barbe, and have fortunately preserved a written memorandum of that conversation, intended for publication at the time, though it has not hitherto appeared in print. I did not then recognise the *third* species; indeed, at that time, I had much less knowledge of the Banteng than I have at present: but I now give the memo. as originally written:—

"M. Barbe had informed me, that, besides the common Gayál (*Bos frontalis*), the Kukis of the interior of the Chittagong hills had a very different species of *Bos* in a state of complete domestication, the exact species of which I could not satisfactorily make out from his description; when, luckily, he remembered that he possessed a horn of one of those tame animals, and, to my very considerable surprise, it proved to be that of a Gaour, or (so-called) 'Bison' of Anglo-Indian sportsmen, an animal which is commonly reputed to be untameable. The huge beasts are, however, stated to be most

* *Vide As. Res.* VIII, 488.

† In Orissa, the Gaour is known to sportsmen and others as the 'Gayál;' although the natives of the province style and pronounce it *Goor*. The names, of course, being branches or *ramifications* of the same root.

perfectly gentle and quiet; and they habitually pass the night and great part of the day beneath the raised habitations of their owners: and M. Barbe further mentions that he was greatly astonished at the facility with which these enormous cattle ascended and descended heights so steep and precipitous, that, had he not witnessed the feat, he would scarcely have been inclined to credit it." The last observation points rather to the Gayál than to the Gaour!

As a rule, the proper *habitat* of the Gaour is an undulating grassy table-land intermixed with forest; the heavy and Buffalo-shaped Gayál being habitually much more of a climber, and also more exclusively affecting the dense craggy forest, where it browses in preference to grazing; the Gaour being much more of a grazer. Having possessed both species alive, I can testify to this difference in their feeding. The Gaour appears to be diffused throughout the Indo-Chinese countries, and all down the Malayan peninsula to the extreme south; but has not been observed on any of the great islands of the archipelago. I have lately seen the skull with horns of an old bull from the mainland near Singapore; and in 1858 I purchased a live Gaour-calf that was brought from Singapore to Calcutta, together with a Malayan Tapir. This calf was in high health when I shipped him for England, and as tame and tractable as any domestic animal, yet full of life and frolic; but he was suddenly taken ill when nearing the Cape, and died on the following or next day. He was very impatient of the sun, even at the height of the cold weather (so called) in Calcutta; which rendered it difficult to secure a photograph of the animal, but a good one was taken, and copied in the 'Illustrated London News;' only the artist must needs improve upon nature by lengthening the tail beyond the hocks, which detracts from the *vraisemblance* of the wood-cut. The Gaour is the only species of the group which inhabits *cis*-Bráhmáputran India, in all suitable districts; extending formerly to Ceylon, where we recognise it as the *Guavera* of Knox; and in Johnson's 'Indian Field Sports,' it is familiarly referred to as "the *Gour* (a kind of wild bullock)" inhabiting, in about 1796, the hill-country bordering on the Dámudá, through which the Grand Trunk Road now runs from Ránigánj to Shergátti,—a district from which it has been long since extirpated, or has retired some hundreds of miles further west. It is still

numerous in various localities, and not always particularly shy where little persecuted: for instance, my late friend Capt. Crump (a distinguished sportsman, who fell most gallantly taking possession of a gun at Láknao,) found them so little shy towards the sources of the Nerbudda, that, on one occasion, a couple of young bulls came trotting fearlessly out of the forest, within easy gunshot of himself and companion on horseback, and continued for some time to trot alongside of them at that distance, till my friend's *sporting* (or destructive) propensities could brook it no longer. Others would have felt much greater pleasure in observing the noble animals thus fearlessly at liberty, and would have been loth to abuse their confidence.

In the catalogue of the specimens of mammalia in the India-house museum, published by the late veteran zoologist, Dr. Horsfield, in 1851, a *Bos asseel* is described as a new species, founded on a preserved head, with the skin on, in that collection. I have drawings of the identical specimen, which I pronounce, with confidence (as I did formerly in *J. A. S.* XI, 445), to be that of a cow Gaour, with horns more slender and turning back more towards the tips than usual; but I have seen others like them, and of all intermediate grades between them and the ordinary type of female Gaour-horns, resembling those of the bull but more slender, and with always a greater amount of inclination backwards at the tips. The specimen in question is figured by Gen. Hardwicke in the 'Zoological Journal,' III, pl. 7; together with a frontlet of a bull Gaour: and the two being by him also supposed to be distinct species.

Of the Banteng (*G. SONDAICUS*), or *Tsoing* of the Burmese, (who designate the Gaour as the *Pyoung*.) we possess two frontlets from Java—one of them particularly fine,—also an imperfect skull with horns from Pegu, and a single horn from the Arakan side of the mountain range which separates that province from Pegu,—both presented by Col. Phayre;—together with a flat skin of a calf from Mergui, resembling in colour the Javanese calf figured by Dr. Salomon Müller, who has given four excellent coloured representations of this animal, of different sexes and ages, and profusely illustrated the skulls and horns. For this calf-skin, the Society is indebted to the late Major Berdmore. The species was long ago indicated in Penant's 'Hindustân,' as a kind of wild Ox "with white horns" inha-

biting the Indo-Chinese countries; and our Peguan specimen has remarkably *albescens* horns, while the single horn from Arakan is darker, and resembles the Javanese examples in our museum. The next and more detailed notice which we can now refer, without hesitation, to this species, occurs in Herbert's 'Gleanings in Science,' III, 61. It would appear that a skull and horns of this animal were presented to the Society at its Meeting of February 2nd, 1831;* "with a descriptive notice by Mr. Maingy; by which it appears, that, when full grown, it is about thirteen hands high, and of a most beautiful red colour, except under the belly which is white. It has no hump, like the cow of India. Altogether, it resembles the red cow of England, but is a much handsomer animal. The bull is a large and fine animal, and, with the exception of having a white forehead, resembles the cow. Mr. Maingy has seen twenty or more of these animals in a herd, but it is a very difficult thing to get a shot at them, as they have a most acute sense of hearing and smelling; one or two appear to act as sentinels, while the others graze or drink. If, in snuffing the air, they find it tainted, off they fly in a moment, with a speed almost inconceivable, considering the form and bulk of the animal."

In the foregoing descriptions, the invariable great white patch on each buttock (whence the name *leucoprymnos* bestowed on the *hybrid* by M.M. Quoy and Gaymard) is unnoticed, as also the dark colour of the old bull: but the alleged "white forehead" of the bull refers doubtlessly to the mass of thickened corneous substance between the horns, which, in our larger Javanese frontlet, is thick and solid enough to turn a musket-ball.† (*Vide* S. Müller's figure of the mature bull.) But, in a notice of "the Burmese wild Cow, or '*Sine Bar*,' which appeared in the 'Bengal Sporting Maga-

* These were not in the museum when I took charge of it in 1841; but only two frontlets from Java, presented by Prince William Henry of the Netherlands (*J. A. S.* VI, 987), one of which has since been forwarded to the India-house museum.

† In our smaller Javanese frontlet (figured *J. A. S.* XI, 490), a portion of this enormously thickened *epidermis* remains attached to the base of each horn, which led Mr. Hodgson to remark, when looking at these specimens as they hung up, that the horns were less approximated at base in the Peguan specimen. However, on close examination, the true base of the horn is seen to be well defined, and the supposed distinction disappears.

zine' for 1841, p. 444, we are informed that "herds of thirty and forty frequent the open forest jungles [of the Tenasserim provinces]. They are noble-looking animals, with short curved horns, that admit of a beautiful polish. The cows are red and white, and the bulls of a bluish colour. They are very timid, and not dangerous to approach. Their flesh is excellent. They are the only cows indigenous to the provinces :"—yet the preceding paragraph mentions "the 'Bison' or Gaour as "attaining a great size in the East."

Here the difference of colouring of the sexes observable in the Banteng (analogous to what is seen in the Nil-gai and Indian Antelope, and to a less extent in the Gayál,) is noticed; and Sir T. Stamford Raffles mentions, that (as also in the Nil-gai,) "a remarkable change takes place in the appearance of this animal after castration, the colour in a few months becoming invariably red ;"* *i. e.* reverting to the hue of the cow and immature bull. The horns cannot justly be termed *short* in an old bull; but it is worthy of remark that, when full grown, they are flattened only towards the base, considerably less so than in the Gaour and Gayál, wherefore, when but half-grown, only the cylindrical portion of them appears, which has given rise to the reports of wild cattle with cylindrical horns inhabiting the Indo-Chinese territories. As shewn by Prof. S. Müller's figures, the Banteng—though still very Gayál-like in general aspect—approximates more nearly in contour to the cylindrical-horned humpless cattle of Europe and N. Asia, than is the case with its immediate congeners, the Gaour and Gayál; and the increased amount of cylindricality of its horns adds to the resemblance. With much of the general aspect of the Gayál, it has longer limbs, and is less heavy and *Bubaline* in its proportions. There is nothing exaggerated about its figure; the spinal ridge is not more elevated than in *B. TAURUS*, and the tail-tuft descends considerably below the hock-joint. Indeed, this animal has been compared to a Devonshire Ox; but it has nevertheless all the general features of the present group, and is true to the particular colouring, shewing the white *stockings* (like the Gaour and the Gayál, and also not a few Indian Buffaloes). The shoulder is a little high, with some appearance of the dorsal ridge behind the scapulæ, but this slopes off and gra-

* *History of Java*, I, 111.

dually disappears behind. The rump also is nearly as much squared as in European cattle. Dewlap moderate, with a different outline from that of the Gayál, more as in the *B. TAURUS*. Colour of the calf bright chesnut, with a black tail-tuft, and also a black dorsal line commencing from where the ridge should terminate behind;* the white stockings having much rufous intermixture at this age. The cows are deeper-coloured, being of a rich light bay; and the old bulls are blackish,—both however relieved by the white on the legs, buttocks, lips, and hair lining the ears, which last are scarcely so large as in the Gaour and Gayál, but of similar shape. The description here given is drawn up from Dr. S. Müller's elaborately careful coloured figures.

The Banteng inhabits Borneo, Jáva, and Báli, and I strongly incline to the opinion that the Gaour, Gayál, and Banteng alike inhabit the Malayan peninsula and Tenasserim provinces; the Gayál, probably, being confined to a certain altitude upon the mountains. Capt. (since General) Low distinctly indicates three species in the Malayan peninsula, besides the Buffalo, in *As. Res.* XVIII, 159. He mentions—"The Bison [Gaour], which is found of a very large size in Thedda, the head [forehead] being of a fawn colour: the wild Ox [Gayál?] of the size of a large Buffalo; and also a species [Banteng?] resembling in every respect the domestic Ox." There is, indeed, the skull of a bull Banteng divested of its horns, labelled "from the Keddah coast," in the London United Service Museum; † and the considerable resemblance of this animal to the humpless domestic cattle of Europe has been mentioned repeatedly. Thus the late Major Berdmore, writing of it from the valley of the Sitang river, remarks—"They are by no means so common here as they are to the south. I have often been in the midst of very large herds of them, and they appeared to me to be very like red domesticated cows." Helfer (no great authority, yet) notices three species of wild cattle, besides the Buffalo, in the Tenasserim provinces. He tells us that—"The great *Bos gaurus* is rather rare, but *Bison guodus* [evidently a misprint for *gavæus*, ‡ *i. e.* *Bos gavæus* of

* This black list is also conspicuous in the calves of both the Gaour and the Gayál, extending both over the dorsal ridge and behind it.

† Figured in *J. A. S.* XI, 470, figs. 1, 2, and 3.

‡ The words may be *written* to look very much alike.

Colebrooke, or the Gayál,] very common; besides another small kind of Cow, called by the Burmese *Fhain*, of which I saw footprints, but never the living animal."* He does not mention the Gayál as *domesticated* in the provinces; and I am not aware that any other writer has there noticed it at all. Still, I consider it highly probable that the Gayál, in addition to the Gaour and Banteng for certain, extends to the more elevated regions of the Malayan peninsula.†

The Banteng is the only species of the three which has been observed in certain of the great islands of the archipelago. The existence of a "wild Ox" in Borneo was long ago noticed by Beckman, as cited by Pennant, who also recorded the occurrence of such an animal in Java, and had likewise (as we have seen) obtained intelligence of one "with white horns" in the Indo-Chinese countries. In Java, according to Raffles, "it is found chiefly in the forests eastward of Pásuran, and in Báli, though it also occurs in other parts of Java." Dr. S. Müller remarks that the Banteng is found in Java in territories which are seldom visited by man, as well in the forests of the plains and of the coast, as in those of the mountains up to 4,000 ft., where it is tolerably common. "We have likewise seen traces of it," he adds, "in Borneo, and have even received a calf from the Dyáks about a month old. According to Raffles, it is also found in Báli, but in Sumátra it does not appear to exist." In the N. E. peninsula of Borneo it would seem to be numerous. Thus, in a 'Sketch of Borneo,' published in Moor's *Notes of the Indian Archipelago*, the writer remarks—"During the wet season, the rivers swell and overflow their adjacent shores, and run down with such continued rapidity, that the water may be tasted fresh at sea at a distance of six or seven miles from their mouths. * * * In the dry season the coast, from these overflowings, presents to the eye the richest enamelled fields of full grown grass for miles around. It is at this season that whole herds of wild cattle range down from the mountains of the interior to fatten on the plains, but during the

* *J. A. S.* VIII, 860.

† The two species of Malayan wild cattle noticed as the *Sapi* and the *Sapan-dang*, in the 'Journal of the Indian Archipelago' IV, 354 (as cited in *J. A. S.* XXI, 433), refer, as I am now satisfied, to the Gaour and the wild Buffalo. Dr. Cantor describes the Gaour to be "numerous in the Malayan peninsula," where known as the *Sapi utan* (literally 'wild Cow'), *J. A. S.* XV, 273. But he enumerates neither the Gayál nor Banteng in the peninsular *fauna*.

wet season they ascend to the hills." Hence we gather that the Banteng is essentially a grazer, like the Gaour, instead of being chiefly a browser like the Gayál, which never descends from its mountain forests.

Another writer in the same work states that, in Báli, "the breed of cattle is extremely fine, almost every one of these beasts being fat, plump, and good-looking; you seldom, if ever, see a poor cow in Báli: it is a breed of a much larger size than the common run of [humped] cattle in Jáva, and is obtained from a cross with the wild cow [bull?] with the same animal. They are generally of a red colour, and all of them are white between the hind-legs and about the rump, so that I do not remember seeing one that was not white-breached. The people have no land expressly devoted to grazing; but let their cattle eat their old stubble or fresh grass of the rice-fields, after the crops have been taken off; and while the rice is growing, they let the cattle stray into the commons or woods, and pick up what they can get by the road-side. The rude plough is drawn by two abreast, which the plougher drives with one hand while he guides the plough with the other." This account pretty clearly indicates domesticated Bantengs; intermingled in blood, perhaps, more or less, with the humped cattle; though there is nought to certify such intermixture in the notice quoted, but rather that—as in the case of the Gayál—both wild and tame exist and interbreed occasionally. However, we have the authority of Professor Van der Hoëven that the *Bos leucoprymnos* of Quoy and Gaynard is a hybrid Banteng; and there is a figure of a cow of this mixed race among the Hardwicke drawings in the British Museum, which—as also in the instance of a hybrid Gayál that I saw alive—partook much more of the general aspect of what may be termed the jungle parent. These hybrid Bantengs are known as 'Báli cattle' at Singapore.

The Rev. F. Mason, in his 'Notes on the Fauna, Flora, &c., of the Tenasserim Provinces' (1852), remarks that "a small Ox from the Shan country is brought down sometimes in considerable numbers, which resembles in its form the English rather than the Indian Ox, but is probably derived from the wild race. Occasionally a young wild Ox is domesticated, and brought under the yoke." This notice should have been more explicit. Crawford remarks—"The Ox is

found wild in the Siamese forests, and exists very generally in the domestic state, particularly in the Southern provinces. Those we saw about the capital were short-limbed, compactly made, and often without horns, being never of the white or grey colour so prevalent among the cattle of Hindustân. They also want the hump on the shoulders which characterises the latter. They are used only in agricultural labour, and the slaughter of them, publicly at least, is forbidden even to strangers. Hence, during our stay, our servants were obliged to go three or four miles out of town, and to slaughter the animals at night. The wild cattle, for the protection of religion does not extend to them, are shot by professed hunters, on account of their hides, horns, bones, and flesh, which last, converted into jerked beef, forms an article of commerce with China.* Are domesticated Bantengs here intended? The existence of hornless individuals is

* 'Mission to Siam and Cochin China,' p. 430.

The people of Laos "have a great many cattle, very small, which yield scarcely any milk, and which they never think of using. When we told them that in our country the milk of the cow was much esteemed, and that it formed a savoury food, they laughed, and only held our countrymen in contempt." (Grandjean, in the Chinese Repository, as quoted by Sir J. Bowring). This prejudice against the milk of the cow seems to be common to all the Indo-Chinese nations, and prevails also in China, whilst the Mantchurian Tartars are great consumers of milk. Even the savages of the Nâga hills, bordering on Asâm, reject milk as food, in the belief that it is of excrementitious nature.

In Earl's 'Voyage to the Molucca Islands and New Guinea' (p. 361), we are informed that "Wild cattle are numerous in Tunor Laut, of a brown colour, and size about the same as that of two-year old cattle in Holland. The natives catch them with rattan, and also shoot them with arrows."

The *Tamarao* of the island of Mindoro (one of the Philippines), as I was informed by Mr. Hugh Cuning, is a small bovine species, but fierce and dangerous to attack, of a dark colour, with horns rising at an angle of about 45° from the forehead." The nearly similar name *Tambadao* is applied in Borneo to the Banteng.

These various wild races and humpless tame races of S. E. Asia and its archipelago demand investigation; and though I have before published in the Society's Journal several of the notices here cited, it is convenient to bring them together, to save trouble in reference. What animal the following passage refers to, in Mrs. Graham's work in Ceylon, I am unable even to conjecture; and certainly do not credit the existence of such a creature. At the Governor's house, this lady "saw, feeding by himself, an animal no less beautiful than terrible,—the wild bull, whose milk-white hide is adorned with a black flowing mane!" The description is explicit enough, so far as it goes, but most assuredly no such animal is known to naturalists; and with the example before us, of what a writer of Bishop Heber's stamp can make of the Gayál, we may cease to wonder at any amount of vagary of the kind on the part of unscientific observers; though why people of education, who undertake to describe or notice an animal, however cursorily, should make such sorry use of their eyes is difficult to comprehend.

not more remarkable than that of hornless Buffaloes and other domestic cattle; unless in the instance of a race little altered from the wild type. Thus the Italian race of Buffaloes, in which hornless individuals sometimes occur, (*vide* figure of the skull of one in Cuvier's *Ossemens Fossiles*.) is considerably more removed from the aboriginally wild type of the species, than are the domestic Buffaloes of India, among which I am not aware that hornless individuals ever occur. But I have read of hornless Yaks; and instances have been known of hornless individuals of different species occurring even in the wild state: a tame Springbok of this description was long in the possession of the Empress Josephine. By specially breeding from such animals, a race of them could be readily established.

In Sumátra, as in Jáva, the ordinary domestic Taurine cattle are humped, small and of inferior quality: but, according to Sir T. Stamford Raffles,—“There is a very fine breed of cattle peculiar to Sumátra, of which,” he remarks, “I saw abundance at Menang Kabu, when I visited the capital of that country in 1818. They are short, compact, well made animals, without a hump, and almost without exception of a light fawn colour, relieved with white. The eyes are large and fringed with long white lashes. The legs are delicate and well shaped. Among all that I saw I did not observe any that were not in excellent condition, in which respect they formed a striking contrast to the cattle generally met with in India [*i. e.* S. E. Asia and its archipelago. India *proper* is styled “Western India” by Crawford]. They are universally used in agriculture, and are perfectly domesticated. This breed appears to be quite distinct from the Banteng of Jáva and the more eastern islands.”* What, then, is it? The remark that these beasts are “perfectly domesticated” would hardly have been made of any race appertaining to the humped or to the ordinary humpless type, but seems to imply that the writer regarded it as a peculiar species, as does also his statement of its distinctness from the Banteng.

In the ‘Journal of the Indian Archipelago,’ II, 831, is a notice of the existence of wild cattle in Celebes; but I suspect that the small *Anoa* Buffalo (*BUBALUS DEPRESSICORNIS*) is intended. In an account of the province of Minahassa, it is there stated that—“wild Cows

* *Lin. Trans.* XIII, 267.

are also found here, principally in the higher parts of the mountains; but they bear little resemblance to the Banteng of Jáva; are below the middle size, yet possess, notwithstanding, an incredible strength." Just possibly an undescribed Taurine may be here indicated.

While illustrating the domesticability of all the flat-horned Taurine cattle indigenous to S. E. Asia, it is not disputed that some species of animals are more easily tameable than others; for instance, the American as compared with the European Bison (by all accounts), or even the domestic humped bull as compared with the domestic European bull. It may be from more thorough association with mankind, from its youth continuously, but it rather seems from constitutional difference (still the result, perhaps, of countless ages of such complete domestication), but the fact is undeniable that the humped bull is far more gentle and tractable than his European compeer; being much more completely in subjection, and hardly (if at all) influenced by those paroxysms of sexual excitement which seem to be as irrepressible as ineradicable in the entire males of most other ruminants. It must be conceded, however, that the European bull is rarely subjected to like conditions,—so much inured to constant handling, and governed by a cord passed through his *septum narium*. But the fact remains (as attested by daily observation) that, under existent respective conditions, the humped bull is—as a general rule—by far the more gentle, tractable, and inoffensive animal of the two.

Since writing the above, I have seen Professor Isidore Geoffroy St. Hilaire's essay 'Sur les Origines des Animaux Domestiques,' 2nd fragment, published in the "*Bulletin Mensuel de la Société Impériale Zoologique d'Acclimation*," III, 496. Of the Zebu, or humped Ox, he remarks, that in ancient times it was doubtlessly much less diffused over the *East* than at present. "Herodote qui avait voyage en Orient, Aristote qui connaissait si bien l'Égypte, la Perse et l'Inde, parlent à plusieurs reprises des Bœufs de l'Orient et des particularités de leur organization, jamais de leur bosse. Pour Herodote, voy. surtout liv. II, III, et V. Je ne trouve pas davantage le Zebu dans l'Éliec and dans Athenée. Ou contraire, Pline (liv. VIII, LXX,) mentionne son existence en Syrie et en Carie. * * * Aristote dit d'ailleurs formellement,

dans un autre passage (liv. II, 1),—“ Une chose qui n'appartient qu'au Chameau, *entre tous les quadrupeds*, c'est qu'il a une bosse sur le dos.” (Trad. déjà citée de Camus, p. 59.) Donc Aristote ne connaissait pas le Zébu.—The frequent representation of the humped bull on Indo-Bactrian coins at once recurs to mind: but I have been favoured with the following note respecting the antiquity of the humped bull in India, by our joint-secretary Mr. E. B. Cowell.—“ In reply to your query,” he remarks, “ I find that a humped bull is expressly mentioned in the tenth book of the Rig Veda. This is generally considered to be a later book than the other nine,—but it is certainly much older than the Bactrian kingdom, not later, at least, than *B. C.* 900 or 1000. The passage occurs in the 10th Mandala, 8th Anuvāka, 2nd Sūkta;—I am sorry to say we have no commentary in the Society's library, and the printed edition has only completed the former half, so that I cannot exactly determine the entire sense of the passage, but part of it is clear enough—that the god of fire is described as rushing along in his course roaring like a humped bull. The words *vrishabhah kakudmán* (here used) are the common terms, which of course occur frequently enough in the later Sanskrit authors. The comparison of Agni (the god of fire) to a bull occurs very often in the earlier books of the Rig Veda, but I don't remember any mention of the hump.”

It is remarkable that the humped cattle were common enough in ancient Egypt, though unknown in the valley of the lower Nile, or even northward of Abyssinia at the present time. According to Sir J. Gardner Wilkinson, the cattle of the ancient Egyptians “ were of different kinds, of which three principal distinctions are most deserving of notice; the short, the long-horned cattle, and the Indian or humped ox; and the two last, though no longer natives of Egypt, are common to this day in Abyssinia and Upper Ethiopia.” *Domestic Manners of the Ancient Egyptians.* III, 33. For an unmistakeable figure of the humped species, vide p. 19, f. 5; though the European type is more commonly represented in Wilkinson's copies, and often the calf frisking about beside its dam, as in 1, 48. Even here the difference of the two species is characteristic; for the humped cattle, when at play, recurve the tail over the back in a remarkable manner; instead of its being held straight out, or assuming the Bisontine bend,

straight for the basal half and then downward, as shewn in the figure cited. Any one accustomed only to the sight of European or humpless calves at play, cannot but feel some surprise, at first, on witnessing the mode in which the humped species carries its tail ; and the propensity of a humped calf to run thus before or beside a horse in harness, and to accompany it for a considerable distance along the road, is a fact of daily observation in this country.

(*To be continued.*)

Literary Intelligence.

The Aynuhi 'Bukht' *آينه بخت* is a work which is not, at all events under this title, mentioned in Elliott's *Historians*. Mr. E. C. Bayley has sent us a copy of the Preface and conclusion of a MS. of it, which has come into his possession. Its author is Bukhtawur Khan, and its date of composition A. H. 1127. The writer brings down the history of the Moghul dynasty from Baber to Aurungzeeb, but we have not yet ascertained from what materials he has drawn his narrative—nor indeed who he was. A copy of the work is being made for the Society's Library.

The following extract from a letter from Lucknow promises information of great interest from perhaps the most classical spot in India.

“Rajah Man Singh has drawn up an account of the divisions of ancient Ajoodhia which I have asked him to give to the Society. He says there were three, viz. “Poorub Rasht,” “Puchim Rasht” and “Uttur KOSALA!” The latter being the modern *Gonda Boraitch*.

He declares also that there were eventually two Buddhist kingdoms which sprang up on the decline of the Ajoodhia Raj—one of

these was at "Sahet Mahet," where he says there are a tope and ruins between Ekowna and Bulrampore. The other kingdom was at Benares—they sprang he declares from the Mourya line of Palibothra.

The most celebrated king of the Sahet Mahet race was "Sohil Deo" slain by Syud Salar, the celebrated general of Mahmood of Ghuzni. The last was "Ram Deo" who fell in battle with Mahomed Ghori three generations later.

He has too given me a hint. He says the copper coins with Lion reverses belong to *Ajoodhia*, the bull and cock coins to Sahet Mahet (king's titles "Mittra and Deo" both) and the Benares kings he says had a trisul as their symbol.

He has given me also an account of a tope near Sultanpore.

Further more he says that in building Sañkatá Ghat at Benares a "lath" larger than that at Allahabad was dug up, but that the barbarians chipped off the letters, and built it into the foundations where it still exists and is visible.

He promises to send me two inscriptions or rather manuscripts in modern Sanscrit, and I have ordered for him a transcript in large letters of Thomas' comparative table of the Devanagari."

We are glad to find that there is a prospect of Dr. Sprenger's carrying out his project of publishing Maqdisiy in the Bibliotheca Indica. It will be remembered that he proposed this undertaking when in Syria in 1854, (See Journal, Vol. XXIV. p. 47,) and that the Society closed with the offer at its meeting in May, 1855, but that on Dr. S.'s return to India he found the Oriental Fund so reduced in resources as to render it unadvisable to proceed with the publication. The subject dropped, and in the following year Dr. S. left the country. He now renews his offer from Berne, and we earnestly hope that the arrangements now being made to give effect to it will be successful.

The following is extracted from a letter from Professor Wright of Dublin to Dr. W. N. Lees, dated March 19th, 1860.

Just now the Government and the mass of the people (led by Trevelyan, Monier Williams, &c.) are possessed with a rage for Romanizing the Oriental characters, and anglicizing the Hindu races, and what not, the result of which, so far as I can see, is, that Oriental learning will sink among us still lower than it is, that we shall have lots of bad Hindustani translations of English books, and that the native literature, which is really useful in a *historical* point of view at least, will be utterly neglected. Your Asiatic Society must bestir itself and try to save what it can. For myself, I am working at the 2nd vol. of the Arabic Grammar, and after that, I shall probably edit a reading book with a complete glossary. Besides, I have on hand, an English Hindustani Dictionary, which I am compiling from my own reading and the best published sources I can get. Have you seen Ahlwardt's onslaught on the fame of Von Hammer, entitled "Chalefelahmar's Qasside von W. Ahlwardt, Greifswald, 1859"—a good book, as is also his edition of an historical work with the title "El Fachri, Geschichte der islamischen Reiche...von Ibn Etthiq-thaqa...von W. Ahlwardt, Gotha, 1860." Further there is the 9th fasciculus of Juynboll's *مرآة الاطلاع* containing the introduction and the notes to the first 2 fasciuli (588 pp. and cviii. pp.) ..Vüller's Persian Lexicon goes on slowly,—I have seen 6 fasciuli in 8 parts as far as *قيوند*....Possibly you may not have seen Chwolson "uber die Ueberreste der altbabylonischen Literatur in Arabischen Uebersetzungen," a most extraordinary work and very interesting, if one could only believe it all. Yet Chwolson is a good and cautious scholar (as his "Ssabier in d. Ssabismus" shows), and has studied this particular branch of the Arabian literature more than any man alive. The chief work is the *Agricultura Nabathæorum* (الفلاحة) *ابن وحشية* along with the translations by *ابن وحشية*.

A letter from Dr. Sprenger dated last October, an extract from which is published in the last No. of the Zeitschrift, announces the result of his examination of the MS. of Wákidy's Mugháziy in the British Museum. Though an imperfect one, this MS. contains a third more of matter than the text published in our Bibliotheca by

M. Von Kremer. It is to be hoped that Dr. Sprenger, who has for the furtherance of his own Biography made a copy of the additional matter, will enable our Philological Committee to bring out a 4th or Supplementary Fasciculus of M. Von Kremer's edition.

Extract from a letter from Professor Holmboe, Christiania, to Baboo Rajendralal Mittra.

“ Dans la dernière mémoire,* j' ai démontré que deux médailles d' or qui ont été découvertes dans deux tombeaux payens en Norvège, ont des types et des légendes, qui sont des imitations de médailles Ariennes. J'y ai encore prouvé, qu' un grand nombre de bractéats (lames avec empreintes à l' un des côtés) d' or ont emprunté leurs types de représentations de Siva ou de Dourgâ de la mythologie Indienne. Comparez par exemple la position du bœuf sur le bracteat scandinave No. 7 de ma planche I. avec le bœuf des sculptures de Mandore et de Java sur ma pl. II. Et les croix mystiques qu' on voit si souvent au commencement ou à la fin des inscriptions anciennes de l' Inde se présentent sur une vingtaine des bractéats surnommés. A la page 201 j' ai encore comparé d' autres symboles, qui se voient moins souvent sur nos bractéats, et qui se trouvent également sur des médailles de l' Afghanistan et de l' Inde.”

* In the last No. of the Transactions of the Christiania Society.

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR JULY, 1860.

The Monthly General Meeting of the Asiatic Society was held on the 4th Instant.

A. Grote, Esq., President, in the chair.

The proceedings of the last Meeting were read and confirmed.

Presentations were received—

From the Madras Government, Selections from its Records No. 64 (containing Report on the Agricultural Exhibitions in the provinces in 1859).

2. From the Government of India, Home Department, a copy of a work containing No. 27 of the Appendix of the Bombay Government record.

3. From the Municipal Commissioners, a copy of their report for 1859.

4. From His Royal Highness the Prince Consort, through Alexander Murray, Esq., of Edinburgh, a remarkably fine stuffed head, with horns, of the Scottish Red Deer with the 'cup' of 'royal crown' to the horns and the tines complete. "This animal was killed by his Royal Highness, the Prince Consort upon Locknagaar on the 8th September, 1859. Weight after being cleaned out 16st. 12lbs." Some further particulars about the specimen are given in the Curator's report.

On the motion of the President, a vote of thanks was unanimously accorded to His Royal Highness for this valuable addition to the Society's collections.

5. From J. F. Galiffe, Esq., two living specimens of the large Gecko Lizard, *Tokki or Toktu*, (*Platydactylas Gecko*) captured at Russa near Calcutta.

6. From Baboo S. S. Ghose a large Medusa cast ashore at Diamond Harbour apparently of the genus *Cepha* of person, but the appendages mutilated of all but their peduncles.

7. From Baboo Rajendra Mallik various eggs laid in his aviaries; also, for exhibition to the Meeting, a stuffed specimen of a newly discovered species of Cassowary, at present unique; five species of this remarkable genus being now recognised, of which two have been first brought to notice within the present year.

The following gentlemen, duly proposed at the last Meeting, were balloted for, and elected ordinary members.

Rajah Bunsput Singha.

A. B. Sampson, Esq.

W. Grey, Esq.

J. P. Grant, Esq. Jr.

Dr. B. Simpson.

G. H. M. Batten, Esq., B. C. S.

E. G. Mann, Esq.

L. F. Byrne, Esq., C. E.

George Shelverton, Esq., and

Syud Ahmed Khan.

The following gentlemen were named for ballot as ordinary members at the next Meeting.

Dr. A. J. Payne, Superintendent of the Insane Hospital; proposed by Mr. F. L. Beaufort, seconded by Major Thuillier.

Captain C. M. FitzGerald, Deputy Commissary General; proposed by Major F. D. Atkinson, seconded by Mr. Atkinson.

T. E. B. Judge, Esq., proposed by Mr. Atkinson, seconded by the President.

The Council reported that they had added Col. Baird Smith and Dr. H. Halleur to the Committee of Meteorology and Physical Science.

The President proposed the following resolution:—

Resolved that the Meeting desires to record its sense of the heavy loss which the cause of Oriental literature has sustained by the death

of Professor H. H. Wilson, and to express at the same time the sincere and affectionate regrets with which this Society finds itself deprived of the advice and assistance of its oldest and most distinguished member.

In moving this resolution, the President spoke as follows :—" I need scarcely remind the Meeting that since we last met the mail has brought us the announcement of the death of a very old, indeed our oldest Member. Horace Hayman Wilson, late Boden Professor at Oxford, died in London on the 18th May at the advanced age of 73 after a connexion with our Society of more than half a century ; for he joined us immediately on arriving in this country in 1808, a period at which we had only just established ourselves in the building in which we now sit. Colebrooke was then our President, and Hunter had been our Secretary with a short interval from 1798, so that by his succession to Hunter as Secretary, in 1810, Wilson has a title to be ranked among our earliest office-bearers. He filled the Secretaryship for 22 years ; in fact until his retirement from India in 1833 ; and during this long period he devoted himself almost exclusively to the study of the Sanscrit classics. His first work was the translation of the *Megha Duta*, and in 1819 he brought out the first edition of the first Sanscrit and English Dictionary which had been compiled. He then published his *Selections from the Hindoo Drama* and the catalogue of the Mackenzie MSS., and was, when he left this country, engaged on his analysis of the Purans, four of which he completed before his departure, and the original MSS. of which are all in our Library. These works, however, were by no means all his contributions to Oriental literature. One of the most important papers which has appeared in our *Researches* was written by him in 1825 ; I allude to his *Essay on the Hindoo History of Cashmere*, which, with other papers, helps to make Vol. XV. of our *Researches* the most interesting, perhaps, of the series.

The address which was presented to Wilson by our President, Sir E. Ryan, and his Vice-Presidents, Drs. Mill and Tytler in December 1832, shows how fully our Society then appreciated the loss which it was about to sustain of his eminent services, while his answer evinced the unabated interest in our Society's proceedings which he was carrying away with him.

At our request he kindly consented to act, as Colebrooke had for some years acted, as our London agent, and it was in this capacity that he so successfully pleaded our cause with the late Court of Directors and obtained for us the monthly grant which now forms our Oriental Fund. The correspondence which we had with Government and with Wilson himself in 1856 is a sufficient proof that he wished still to take a part in our deliberations for appropriating this grant; and it must be a source of gratification to us now to feel that in bringing out the Persian historical texts which we have lately resolved on undertaking, we shall be working more than we were a few years back in the special direction in which he wished to lead us.

What Wilson had been to our Society during his stay in this country he has since his return to England been to the Royal Asiatic Society which Colebrooke had founded ten years previously. Whether as President or Director, he has been its moving spirit at least on all occasions on which Indian subjects were to be dealt with. Besides his contributions to the transactions and Journal of that Society he found time to bring out a further edition of his Sanscrit Dictionary, "*Ariana Antiqua*," a work of the greatest archæological and historical value, a Glossary of Indian terms, and a continuation of Mill's History of India up to Lord William Bentick's administration. His introduction to the Sanscrit Grammar is known to every student of the language, and his edition of his old fellow-passenger, Moorcroft's Travels in the Himalyan provinces, to every geographer. The last work on which he was engaged was the translation of the "*Rig Veda*," and his determination himself to effect its completion is strikingly shown by the way in which he has anticipated Müller's edition of the Text. Wilson died a few days only before the 37th Anniversary Meeting of the Royal Asiatic Society. He had when vacating the Presidentship of that Society in 1858, and acknowledging the usual resolution of thanks which Mr. Marshman had moved, and in which a hope was expressed that he would soon re-occupy his proper post, made a touching allusion to the improbability of his surviving the interval which must by the Rules of the Society precede his re-election.

What little I have said does not profess to approach to an ade-

quate notice of so indefatigable a man and so complete a scholar. It is intended only to preface the Resolution which I hold in my hand, and to which I am going to ask the assent of this Meeting.

Communications were received—

From J. Obbard, Esq., a paper on the "Translation of waves of water with relation to the great flood of the Indus in 1858."

2. From T. Oldham, Esq., extracts of letters from J. L. Stewart, Esq., M. D., 14th Punjaub Infantry employed with the expedition to the Wuzereee country:—

"I generally pick up a bit of stone here and there, but as I have made no arrangements for the carriage of such heavy goods, I am obliged to be contented with very 'wee bits' which I suspect would be much too minute to be of use to you. Next time, if I have another chance, I purpose making better arrangements in this respect. Near where we have been encamped recently, blocks big and little were abundant (I nowhere have seen it in strata or in situ) of a calcareous rock crammed with corals, echinide mata (?) and shells of various species, some not uncommon, but I have not seen a trace of vegetables or of higher animals. This doubtless partly depends on my want of practice. Almost all these are, however, too bulky for my means of stowage.

"The expedition started from Ták (to the N. W. of Dera Ismael Khan) and hitherto we have been advancing up the bed of a small stream called the Zam. We have only come 24 miles from Ták, but will go on to the central city of the Wuzerees (Kaneegorm) some 25 miles apparently, to the west, on a mountain which ought to be near the watershed of what here represents the "Suliman" range. The mountain has been calculated from a distance as upwards of 11,000 feet, but as yet although we rise very considerably with the slope of the bed of the Zam, we have gained no great elevation. The stream cuts through the ridges crossing them, and gives numerous sections, as do the innumerable ravines and gullies.

"For the first ten to twelve miles from the plains the rocks were all soft standstones and conglomerates alternating, at first dipping to the west mostly at a low angle, and presenting a steep escarpment towards the plains of Ták on the east, latterly dipping to the east and contorted variously at varying angles. We then came on cal-

careous strata and for the last five or six miles the rocks are mostly of rapidly disintegrating strata, red, greenish, and with salt efflorescing on the surface. Amongst these, which on the surface become earthy masses, are some nummulitic beds alternating with non-fossiliferous grey limestone and strata of sandstone and grit, often vitrified and darker coloured externally. All these dip to the east at all angles varying from 1° to 90° , but mostly from 15° to 45° , roughly speaking, amongst them are a few thin beds of flint. The masses with corals lie about on the surface and in drift masses, in something like a line parallel to these strata.

“Upon the lower parts of these inclined strata in many places are plateaux of gravel having amongst it large vitrified-looking blocks. These plateaux are of several acres in extent, and from 50 to 100 feet above the bed of the stream. Occasionally below that, and a few feet above the stream, are patches of alluvial soil cultivated by the inhabitants, apparently very fertile.

“The day following we made a march of $4\frac{1}{2}$ miles up the Zam ravine, till we came to a *tangai* (a ‘tightness’ as they call their passes in Pushtu) beyond which the General considered it advisable not to go that day. The strata composing the hills on either side, so far as they were not obscured by the horizontal shingle beds, appeared to consist mostly of a brownish limestone alternating with beds of the coloured disintegrating shales, the latter far exceeding the former in quantity, all dipping to south-east at moderate angles.

“In front of us, the stream came through a narrow gorge between a height of perhaps 200 to 250 feet, composed of a light coloured limestone with numerous veins of calcareous spar running in all directions through it. Its strata considerably waved, and with a low dip to the north-west. The strata of these heights seemed at the point of junction to overlie the coloured strata, but I had not an opportunity of getting close to the point.

“The 4th was rather a momentous day, and I had not much time for dawdling and looking about, as some five miles up, the Wuzerees stood, and *the* fight of the expedition came off.

“After we passed through the *tangai* the strata were mostly of greyish non-fossiliferous limestone overlying unconformably beds of the coloured shales. The uppermost beds of the limestone here had a

character, which I had occasionally remarked before, of 'tessellation,' that is, were divided into little quadrilateral blocks, the upper edges of which were rounded.

"Beyond the Barrarra pass, where the fight took place, the lower strata visible were the coloured disintegrating beds, generally at a high angle with dip to south-west; the higher hills of the waved limestone dipping to S. W. at a *low* angle.

"On the 5th, we made a march of 15 miles, notwithstanding our many wounded, to Kaneegorm, and the flora was so new, that I had not much leisure for looking at the rocks. Our camp at Kaneegorm was trigonometrically 6,700 feet above the sea level, and we probably rose more than 2,500 feet in that march.

"We gradually appeared to leave the limestone rocks, although (occasionally) the coloured rocks were seen overlaid by limestone, and got among hills composed of slate in very thin beds, mostly and frequently with markings of angle (?) over their surface. These slate strata were frequently contorted and wavy.

"For the last two days the quantity of granitic stones among the gravel, was very much on the increase. About and below Palasin, (the place whence I wrote my last letter,) hardly a bit of granite was to be seen; here the shingle is almost entirely granitic.

"6th halt.—7th.—I went with the survey party to the top of a hill to the S. S. W. some six miles off, and 1600 feet higher than the Kaneegorm camp. The strata on the way appeared mostly of what looks like a thin bedded sandstone (?) generally dipping to N. W. at pretty high angles.

"Our road up to Kaneegorm had lain still in the bed of the Zam ravine, and latterly in that of one of its tributaries. As we got near the centre of the range here the streams became quite small.

"On the 8th, we marched eight miles down the stream on the same road by which we had come, and then I had more opportunity of noticing that in a general way the ranges run north and south, and that the strata, although occasionally horizontal and often contorted, are generally at an angle of about 45°, with the dip to the west (W. N. W). The beds are mostly thickish and of slaty rock, with occasional strata of bluish disintegrating schistose structure.

"There were, however, but few sections to be seen on account of

frequent masses of horizontally deposited shingle, mostly granitic, or of the above rocks. Further down, the upper strata appear generally the grey contorted and waved slaty, overlying and hardly conformable with the thinner bedded blue slaty rocks.

“10th.—We left the road by which we came up, and diverged to the northward some five miles. The strata mostly of the thick bedded grey slaty rocks, contorted, and at varying angles, and dip generally not far from horizontal.

“Here we were within a mile of another central cluster of their villages called Makin and the nearest point to which we got to the central mass of this range of hills called Pirghar or Ghal, points of which towered some 2000 to 4000 feet above us. Where the stratification can be seen, as in the nearer masses, it appears nearly vertical and bent.

“On the 11th with one of the covering parties of a burning expedition to these villages, I got on a ridge somewhat nearer to Pirghar. The surface of this ridge is mostly composed of shingle, granitic, and very rarely slaty grey rock visible *in situ* nearly vertical.

“On the 12th a march of eight miles, still northerly, up a bank bed, and camp at about 7300 feet; the highest camp we had. Just on reaching camp passed a number of strata of the alga, marked, thin, bluish, hard, shaly strata overlying beds of the thick, vitrified looking rock. I mentioned before, both at a high angle dipping to the west. The general disposition of the grey slaty rock we saw is, however, nearly horizontal, with a slight dip to east. Most of the valley in which we progressed was a mile wide, and occasionally more, filled up by horizontally disposed shingle beds, our road being up the bed which the stream has cut through these.

“14th.—Marched five miles still to northward. For $1\frac{1}{2}$ miles we rise, then down a steep rocky ravine; rocks mostly shaly, and the vitrified looking varieties generally at high angles, dip to east; some of the strata occasionally much contorted.

“For days, evidences of the Iron manufacture for which Kanee-gorm has long been famous had been visible, such as furnaces and slag, &c., with occasionally, in villages, stores of iron stone. None of the latter, however, did I happen to see. Here I thought we

must be near the ore, and made some efforts to get at some place whence they dig it, but am sorry to say, failed.

“15th.—We went more to eastward descending towards Bunnoo in the ravine of the Khyssor stream. The rocks mostly slaty, and the ‘vitrified’ at high angle dip to the west, and often covered by horizontal shingle beds to 50 or 60 feet, which obscure matters greatly, so that sometimes for a mile or two no rock *in situ* could be seen. The lower beds of this shingle are here occasionally consolidated into conglomerate.

“16th.—The strata, mostly of the dark “vitrified” surfaced rock, generally at about 45° dip to west. Then a grey rock with white streaks (limestone) nearly horizontal and contorted, then with a strong dip to west and still contorted; occasional shaly beds.

“17th.—Halt. Here we were in a region of plateaux of the horizontally laid gravel with, a mile or two to south, the western termination of a flat sloping hill with the strata dipping slightly to the east.

“18th.—A mile or two on we pass through the gorge formed by the stream crossing through the end of the above hill, which is of non-fossiliferous limestone. This appears to be near the geological ‘level’ of Palasin; for here, also, there are numerous heaps of the black decomposed rock we had there, with other particoloured debris: vertical strata of the white non-fossiliferous limestone. Numerous blocks of the coralline (?) rock seen lying about, but I could not get near any of them. Nummulitic blocks and pebbles numerous among the shingle. Then after about a mile of these heaps of coloured debris we go through a gorge formed by nearly vertical ridges of dark coloured hard sandstone, followed by sandstone strata also at a high angle (dipping to east) with one or two strata of conglomerate. Blocks of the dark superficially vitrified stone profusely strewn over all the heights.

“On the 19th a mile and a half carried us from among these low ridges into the Bunnoo plain, here stony, mostly uncultivated, and sloping from the hills.”

In forwarding these extracts, Mr. Oldham writes as follow:—

Nainital, June 9th, 1860.

MY DEAR GROTE,—I enclose you a brief extract from a note received from Dr. Stewart of the 14th Punjab Infantry, who is at present with

Chamberlain's expedition against the Wuzerees. Dr. Stewart is devoting his leisure moments, principally to botanizing, I believe, but he has in his note given some geological details which are of great interest. It has hitherto been supposed that the rocks representing the Siwalik group extended very much further to the west from the plains of upper India, even beyond the Ghilza range, but this note shews the occurrence of nummulitic beds within a very few miles of Ták.

The soft sandstones and conglomerates are, I think, clearly the Siwalik group, and probably the upper portion of this enormously thick series. The physical structure of the hills there, also, appears to correspond with that of the Siwalik hills here. They run to the N. W. presenting a scarp to the plains of beds dipping sharply into the hills. The calcareous beds associated with red, greenish, and white shaly beds rapidly disintegrating into earthy masses seem to represent the lower part of the nummulitic series; at least this is the general character of that part of the group in these hills. The layers of *chert* or flint are frequent here as there. If this conjecture be correct, it must follow that there, as here, a great fault separates these two series.

The remarkable fact of the streams cutting across the ridges of the outer or Siwalik rocks is abundantly paralleled here too, and nothing is more striking on passing up the river gorges here than the marked plateaux or terraces of gravelly detritus which occur at various levels, such as are noticed in Dr. Stewart's note.

I sincerely hope to have further information from the writer of the interesting note regarding a country of which we know so little.

Yours sincerely,

(Signed) T. OLDHAM.

Since forwarding the above notes, specimens of the iron stone used on these hills has been received from the Government of the Punjab, and submitted to assay in the Geological Survey Office, Calcutta. The results are as follow.

The specimens consist of samples of a rock which is itself composed of iron ore in two distinct conditions.

(a) One portion is a common hydrous peroxide of iron containing 40.4 per cent. of iron.

(b) The other is a similar mineral mechanically mixed with carbonate of lime, in small quantities, the mass containing 31.8 per cent. of iron.

LIBRARY.

The following books have been added to the Library since June last.

Presented.

General Report of the Municipal Commissioners of Calcutta for 1859.—
BY THE COMMISSIONERS.

Selections from the Public Correspondence of the Punjab Government,
vol. IV. Nos. 4 and 5.—BY THE GOVERNMENT.

Selections from the Records of Travancore. Part I. (containing Memoir
of Travancore).—BY THE MADRAS GOVERNMENT.

The Oriental Christian Spectator for May.—BY THE EDITOR.

Bibidhartta Sangraha for the month of Kartick.—BY THE EDITOR.

Selections from the Records of the Madras Government, No. 64, (con-
taining Report on the Agricultural Exhibitions in the Provinces in 1859).—
BY THE MADRAS GOVERNMENT.

Proceedings of the Academy of Natural Sciences of Philadelphia from
October, 1859, to February, 1860.—BY THE ACADEMY.

Proceedings of the Royal Society of London, Vol. X. No. 38.—BY THE
SOCIETY.

Description of a deformed fragmentary human skull, found in an ancient
Quarry cave at Jerusalem.—BY J. Aitken Meigs, M. D.—BY THE AU-
THOR.

Exchanged.

The Athenæum for April, 1860.

Journal of the Academy of Natural Sciences of Philadelphia. New se-
ries, Vol. IV. Part 3.—BY THE ACADEMY.

Zeitschrift der Deutschen Morgenländischen Gesellschaft. Band, XIV.
Heft I. and II.—BY THE SOCIETY.

The Philosophical Magazine for May, 1860.—BY THE EDITORS.

Purchased.

The Literary Gazette, Nos. 95, 96, 97 and 98.

Comptes Rendus, Nos. 15, 16, 17 and 18 of Tome L.

Revue des Deux Mondes, Tomes 26 and 27.

Annales des Sciences Naturelles, Tome XII. No. 2.

Journal des Savants for April, 1860.

The Natural History Review, No. 26.

The Annals and Magazine of Natural History, Vol. V. No. 29.

Die Leider des Hafis, Vol. II. Part 4.

Vendidad Sadé, VI. Livarison.

FOR AUGUST, 1860.

At a meeting of the Society held on the 1st instant, A. Grote, Esq., President, in the Chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received—

1. From C. Hobhouse, Esq., C. S., nine silver coins found in May last year, in throwing down one of the old Embankments on the right bank of the river Damoodah in Pergunnah Hubilee of the district Hoogly. These coins are of the last century, from the Moorshedabad mint.

2. From Michael M. S. Dutt, Esq., a copy of his work named "The Birth of *Tillottoma*," being the first epic poem in blank verse in the Bengali language.

3. From the British Indian Association, a copy of their Report for June last.

4. From C. J. Evans, Esq., Calcutta, frontal portion of skull of an African baboon, probably *Cynocephalus hamadryas*, found by himself in the dry well of the pyramid of Cheops. The specimen is quite recent.

5. From the Rev. H. Baker, Junior, of Mandakyam, Alipee, S. Malabar, skins of *Sorex marinus* and *Sciurus trilineatus*.

The following gentlemen, duly proposed at the last meeting, were ballotted for and elected ordinary members:—

Dr. A. J. Payne; Capt. C. M. Fitzgerald, and T. E. B. Judge, Esq.

The following gentlemen were named for ballot at the next meeting.

W. Forbes Goss, Esq., proposed by Mr. Medlicott, and seconded by Mr. W. Blandford.

Major T. James, Bengal Army, proposed by Dr. Crozier, seconded by Mr. W. S. Atkinson.

The Council reported that they had nominated Major H. L. Thuillier a member of their body and also a Vice-President of the Society in the room of Col. Strachey, who has left India.

Communications were received—

1. From Lieut. Col. A. Phayre, Commissioner of Pegu, a paper entitled "Remarks upon an ancient Buddhist Monastery at Pu-gân on the Irrawaddy."

2. From Dr. J. L. Stewart, 14th Punjaub Infantry, a Journal of a Botanical Tour in Hazara and Kháján in April and May, 1859.

Extracts from this paper were read to the meeting by Dr. Thomson.

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